WESTERN GAS

May
1930

20 Cents
the Copy

Nordstrom Valve

. . . WITH "MERCO LUBRICANT" THIS VALVE DOES NOT LEAK!

By inserting a stick of "Merco" Lubricant in the shank of a Nordstrom Valve and turning the lubricant screw and plug, the valve is made leak-resistant and sticking is prevented. The entire operation is simple—takes but little time—and thoroughly lubricates the valve.

"Merco" Lubricants are manufactured in stick form to fit any size Nordstrom Valve and there is a special lubricant for every valve service. The proper "Merco" Lubricant for any particular valve installation will be gladly recommended by our engineers.

Write for latest Catalog

NORDSTROM
—the perfect application of a principle....

MERCO NORDSTROM VALVE COMPANY
SUBSIDIARY OF THE MERRILL COMPANY
Engineers . . . Manufacturers

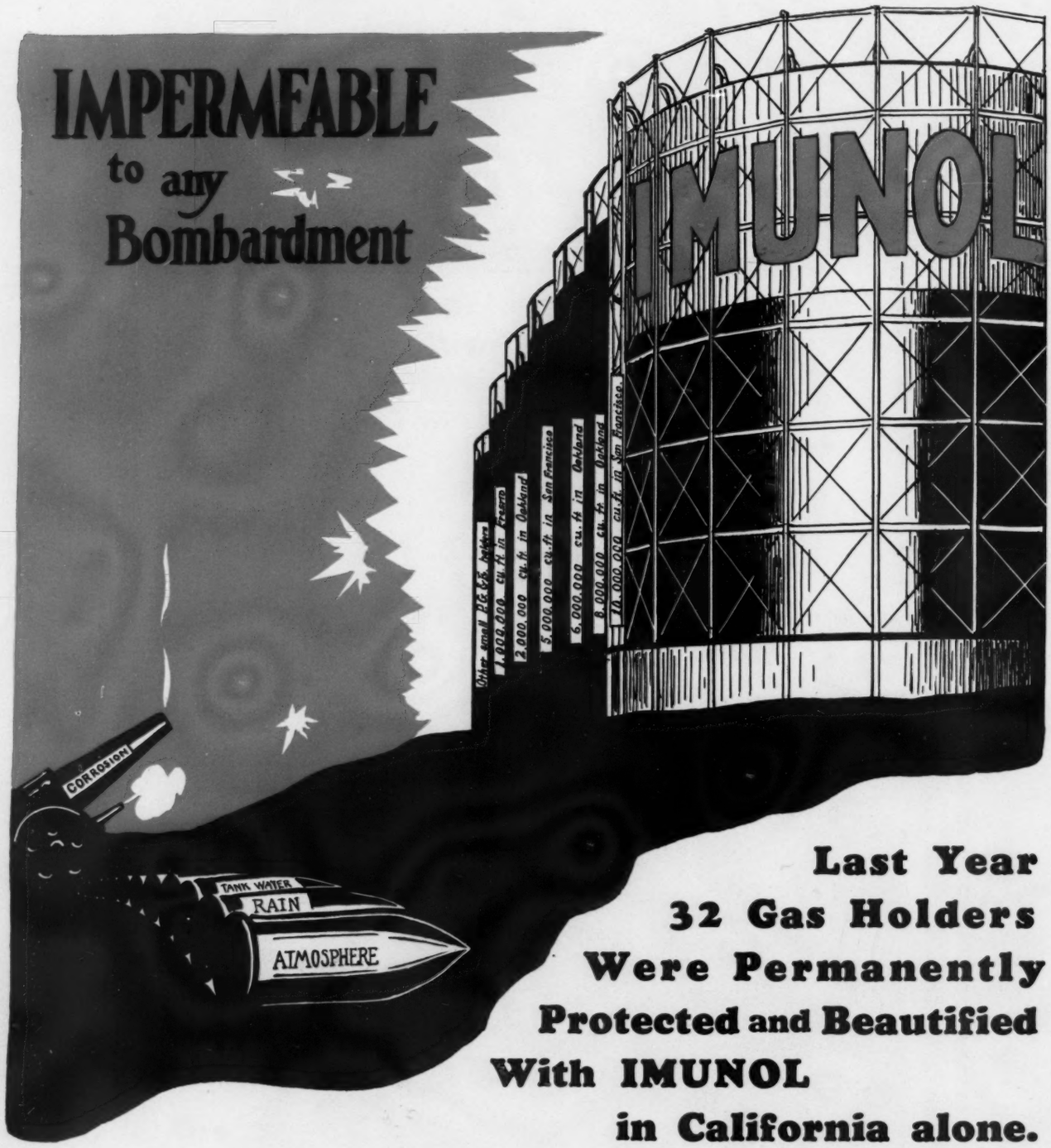
Atlanta: Healey Building **Boston:** 184 Boylston St. **Buffalo:** Genesee Building **Chicago:** 176 W. Adams St. **Dallas:** Magnolia Building **Detroit:** 2842 W. Grand Blvd. **El Paso:** 111 S. Virginia St. **Los Angeles:** 556 South San Pedro St. **Houston:** Petroleum Building **New Orleans:** Masonic Temple Building **New York:** 11 W. 42nd St. **Pittsburgh:** Clark Building **San Francisco:** 343 Sansome St.

AGENCIES IN PRINCIPAL CITIES

Factories: Oakland, California and Belleville, New Jersey. ***Canadian Manufacturers:*** Peacock Bros., Ltd., Montreal, Cobalt, Winnipeg, Vancouver. ***England:*** Audley Engineering Co., Ltd., Newport, Shropshire ***Buenos Aires, Argentine:*** General Electric, Soc. Anon., Victoria 618 Esq. Peru.

A MONTHLY JOURNAL DEVOTED TO THE WESTERN GAS & APPLIANCE INDUSTRIES

NATURAL GAS EDITION



Last Year
32 Gas Holders
Were Permanently
Protected and Beautified
With IMUNOL
in California alone.

The importance of exterior and interior gas holder protection with IMUNOL is being more and more recognized.

Tank Water contains free oxygen. Tank Water plus Oxygen = CORROSION. Corrosion (with the resulting discoloration) takes place on both the visible Exterior and the invisible Interior.

May we tell you how large and small gas companies have successfully and definitely put a stop to this corrosion?

INERTOL CO. INC., 253 Broadway, New York, N.Y.

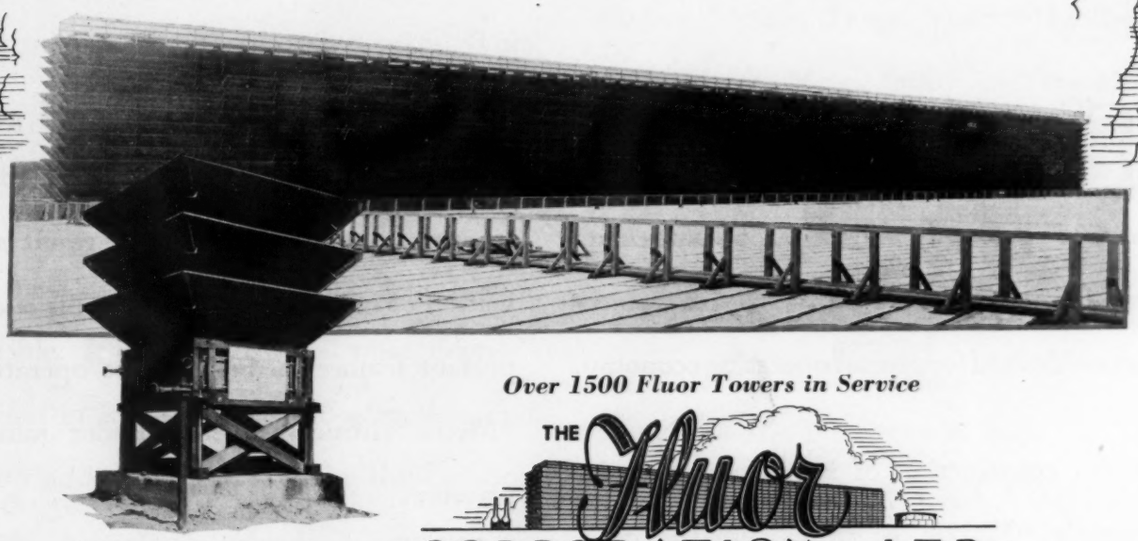
Pacific Coast Representative: **B. W. Mueller, 447 Sutter Street, San Francisco, Calif.**

Balanced PERFORMANCE

Fluor Towers Afford Operating Flexibility Without Sacrificing—

1. **Pumping Economy**
2. **Low Spray Loss**
3. **Uniform Distribution**
4. **Maximum Space Utilization**
5. **Capacity Range**

An inquiry to our nearest office will bring you full particulars.



Over 1500 Fluor Towers in Service

THE Fluor CORPORATION, LTD.

(Successors to Fluor Construction Co.)

909 East 59th St., Los Angeles, California

Tulsa, Okla. National Bank of Commerce Bldg.

New York, N. Y. 30 Church St.

Dallas, Texas Magnolia Bldg.

Houston, Texas 2nd National Bank Bldg.

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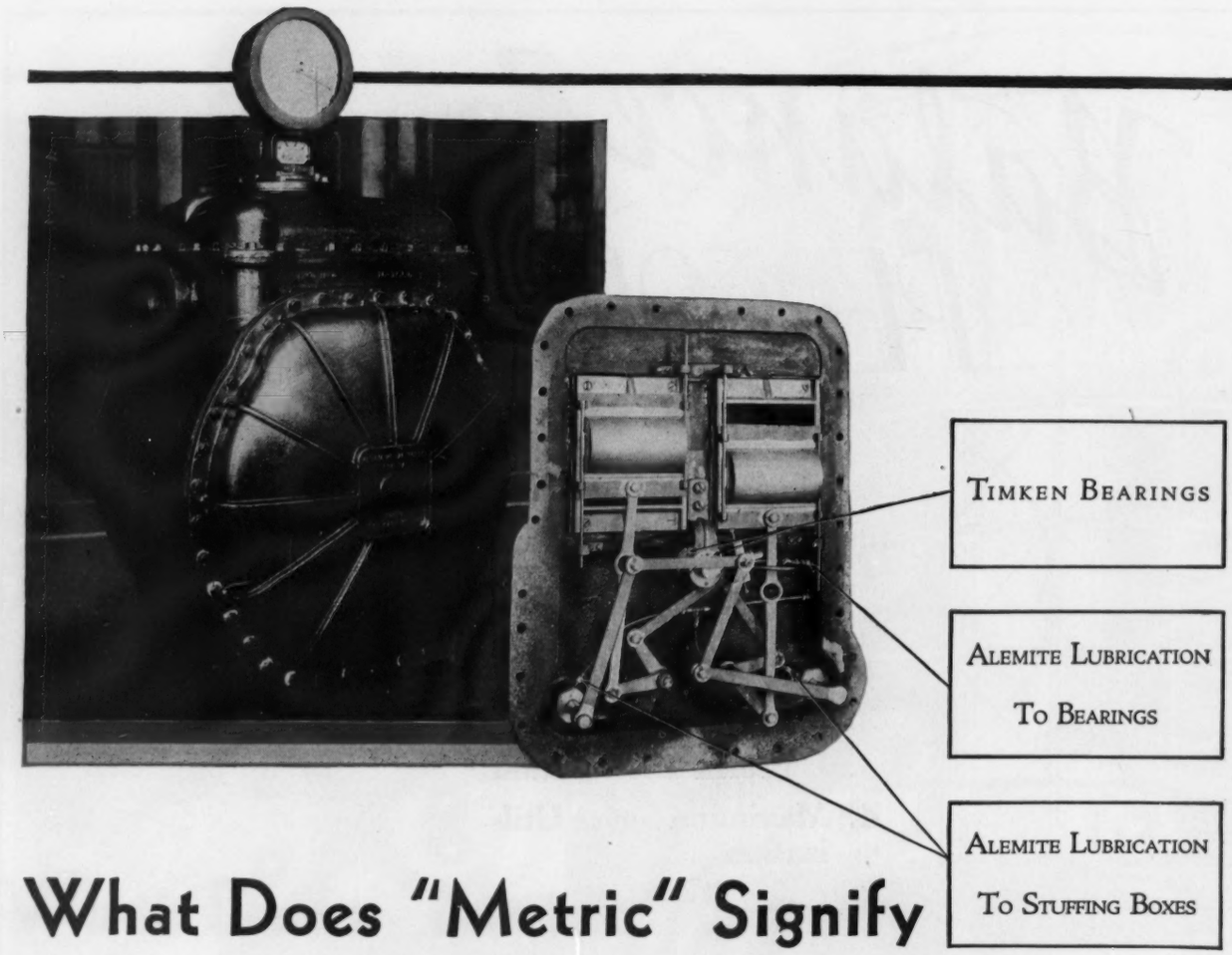
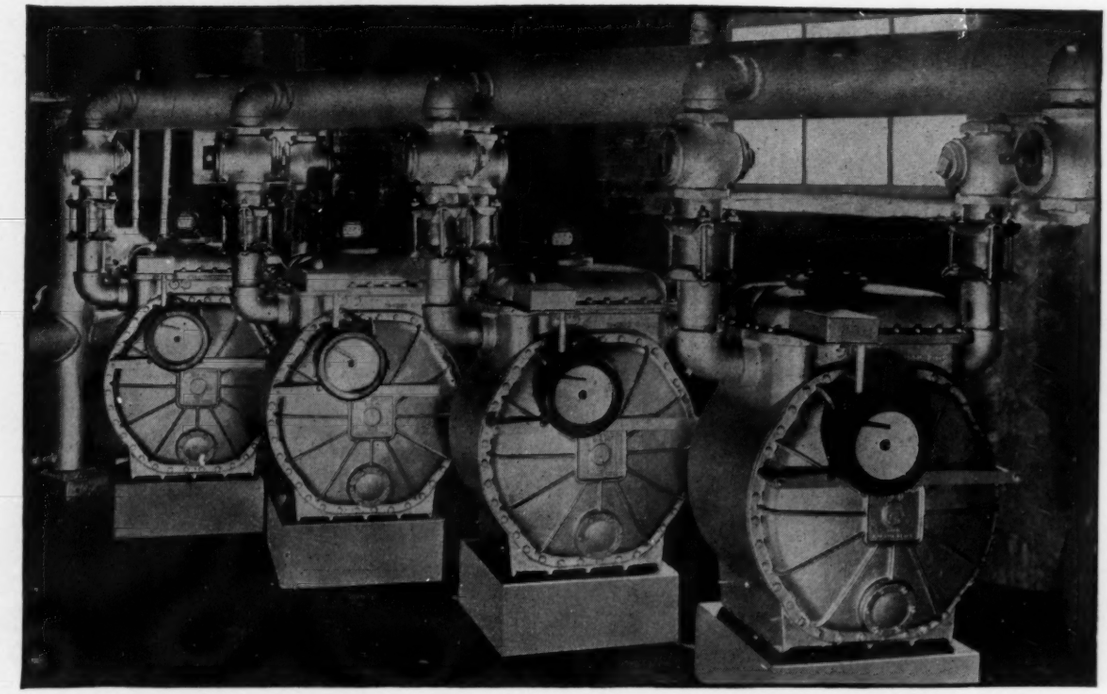


What Does "Metric" Signify In Ironcase Meter Construction?

TO general specifications for the purchase of ironcase meters the trade name "Metric" promptly adds a bill of particulars —an impressive number of exclusive features that are desired for greater operating economy.

In the construction of ironcase meters, for example, "Metric" signifies that the case, table, partition and channels are all cast in one piece. No machine joints and gaskets. No separation of interior divisions through strains or climatic changes. The result is elimination of interior gas leakage. This is an important feature in the accurate operation of "Metric" ironcase meters under minimum pressure.

In the larger sizes of ironcase meters



An actual photograph of an Industrial Installation showing four 500-B Metric Ironcase Meters equipped with GG-9 Recording Demand Attachments operating on the lines of the Public Service Company of Northern Illinois.

"Metric" signifies Alemite lubrication, Timken Bearings and a special valve motion. All of these features of construction have been used with success for the past five years. They minimize friction and proportionately reduce the wear of moving parts.

The new illustrated bulletin, EG-40, is now available. It explains in detail what "Metric" signifies in ironcase meter construction, and it also adds materially to the information which American Meter Company is constantly furnishing to the gas industry.

Complete information is also available on Orifice Meters, Large Volume Linderman Office Meters, Metric Indicating Flow Meters, and Metric Rate-Volume Controllers.

AMERICAN METER CO MEASUREMENT ENGINEERS CUBIC FEET

METRIC METAL WORKS
ERIE, PENNSYLVANIA
IRONCASE, TINNED STEEL CASE and ORIFICE METERS

AMERICAN METER COMPANY
INCORPORATED
The World's Largest Manufacturers of Gas Meters and Allied Apparatus
ESTABLISHED 1836

SALES · ERIE · DALLAS · TULSA · DENVER · LOS ANGELES · SAN FRANCISCO · KANSAS CITY
SERVICE · PITTSBURGH · CHICAGO · PHILADELPHIA · NEW YORK · BALTIMORE · BOSTON · ALBANY

The third of a series of advertisements by the Oklahoma Contracting Company showing the history and the development of the pipe line industry

THE TEAMSTERS FOUGHT THE BATTLE OF THE PIPE LINES IN PITHOLE CITY

A traveler in Pithole County, Pa.—the scene of America's first oil boom—could journey a whole day without seeing either the beginning or the end of the wagon train. Six thousand wagons, each carrying from five to seven barrels of oil, constantly plied the roads between Pithole City and barges on Oil Creek.

Oil at the well sold for ten cents a barrel. The drivers of the wagons, realizing that they were the most important link in the economic chain of oil production, named and got their own prices for hauling it from the field. At a cost of three dollars or more per barrel for transportation, the operators saw that within a short time it would become uneconomic to develop the field.

Then out of the mire of the oil field, there arose the oil industry's greatest benefactor. Samuel Van Syckle believed that oil, like water, could be pumped through pipes. In 1865, he laid a two-inch pipe from Pithole City to Miller's Farm, a distance of four miles.

On the St. Louis-Monroe 22" Gas Line

The teamsters, their livelihood threatened, protested. Collecting tanks were burned. Wells were fired. The pipe line was cut. Men on the job of laying the lines were attacked and beaten. Finally the militia was called out to protect the men who were working on this first pipe line.

Today the 156,000 miles of trunk pipe lines in use in the United States evidence the fact that no one man nor many can stay the hand of progress. Throughout the South and West, the Oklahoma Contracting Company has laid many of the pipe lines that bring the power of the oil and gas fields to the industries of the world.

Making history in modern pipe line construction. . . .

On the Interstate Gas Company's line from the Panhandle to Denver, 86.7 miles of 22-inch Dresser coupling pipe was laid in 80 working days by the Oklahoma Contracting Company. This line was tested to 400 pounds gas pressure with no leaks.

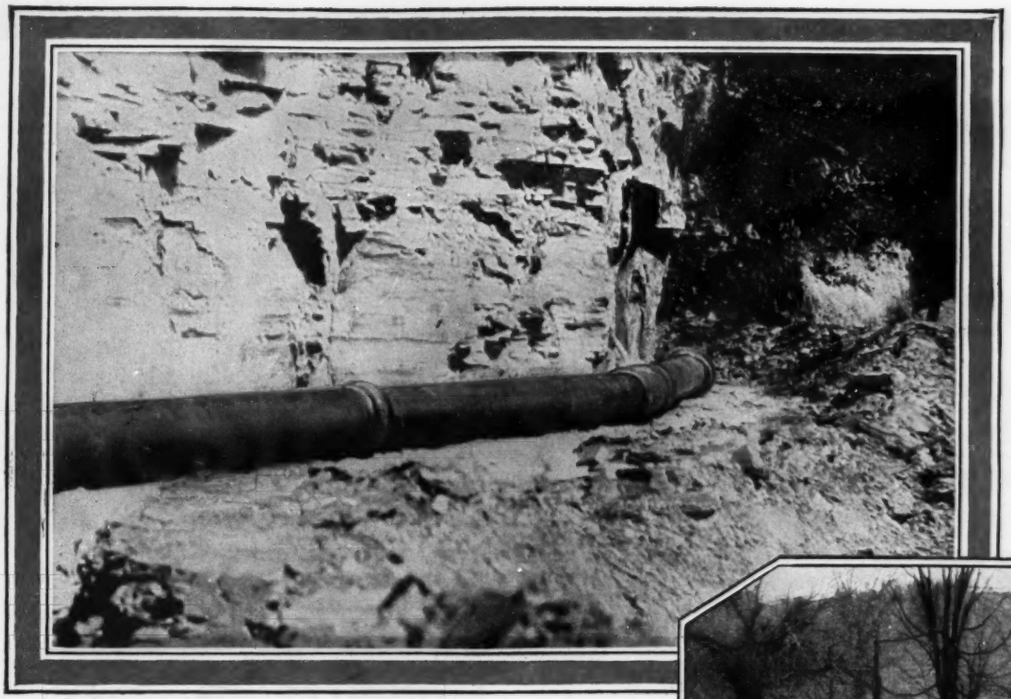
On the Shell McCamey main line to St. Louis 99 miles of 10-inch welded pipe went into operation 60 working days from the time the Oklahoma Contracting Company's gangs broke the first ground.

Transportation is still the most important link in the economic chain of oil production. The Oklahoma Contracting Company's past record of achievement is their guarantee of a good line on the contract specified time.

OKLAHOMA CONTRACTING COMPANY

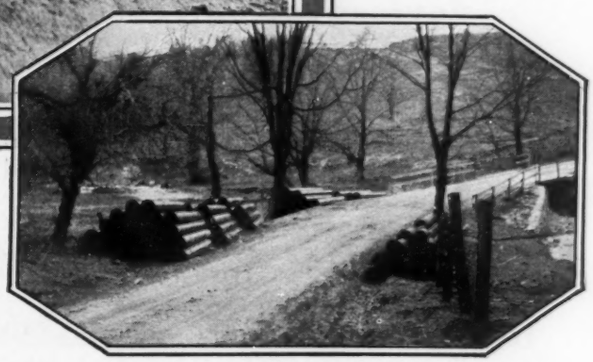
PIPE LINE ENGINEERS AND CONTRACTORS

General Offices: 1205 Allen Bldg., Dallas, Texas • Branch Office: Oklahoma Gas Bldg., Tulsa, Okla.



deLavaud pipe line along the bank of a winding creek. Orchard Park, New York

Below:—deLavaud pipe for the above installation arrives ahead of the construction gang.



Strong, flexible deLavaud pipe for this long winding installation

It certainly took sturdy, flexible pipe to make good under the conditions shown here. The contract called for a pipe line to be laid on a rocky shelf following along the bank of a winding creek. deLavaud pipe was chosen for the job and it is fulfilling the requirements to the letter.

For deLavaud pipe combines superior strength with flexibility. It is made by pouring molten iron into a rapidly revolving cylindrical mold. Centrifugal force holds the molten metal against the sides of the mold and impurities are driven out at the center with a pressure forty times greater than gravity.

The controlled annealing process is another reason for the strength and flexibility of deLavaud pipe. Every length is placed in a specially constructed oven and uniformly annealed. This helps bring about the fine, even-grained texture of the metal and eliminates any possibility of casting strains.

deLavaud pipe is manufactured in accordance with U. S. government specifications. We are also making and furnishing this product in the various thicknesses and weights shown in the specifications of the American Water Works Association and the American Gas Association. Write for complete information about deLavaud pipe today.

United States Pipe and Foundry Co., Burlington, N.J.

Our pipe bears the "Q-Check" trademark of The Cast Iron Pipe Research Association

Sales Offices: New York, Philadelphia, Pittsburgh, Cleveland, Buffalo, Chicago, Dallas, Birmingham, Kansas City, Minneapolis, Seattle, San Francisco, Los Angeles

AMERICAN METER COMPANY

The World's Largest Manufacturers of Gas Meters and Allied Apparatus

.... builders of dependable and accurate measurement devices for 94 years!

TODAY, the American Meter Co. supplies the Gas Industry from ten trade-named factories, strategically located from coast to coast. Each factory is an integral part of a comprehensive manufacturing organization, supervised by trained Engineers. A pioneer in the industry, the American Meter Co. is still a pioneer in the development of improved gas measuring and testing apparatus.

Westcott Orifice Meter

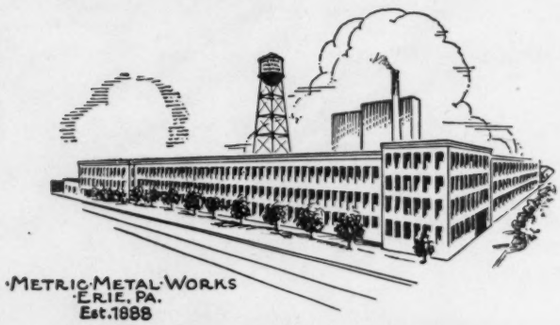
Originally furnished for the measurement of natural gas in 1915. Today this meter is being extensively used as standard equipment for the measurement of all kinds of gases, steam and liquids. Bulletin E-2 will be sent on request.

Indicating Flow-Meter

Metric indicating flow-meters measure the maximum flow of gas, oil, water or air. Readings are indicated in cubic feet, gallons or barrels—per minute, per hour or per day. These meters are sensitive to the slightest change and are readily adapted to meet specific conditions.
Ask for descriptive Bulletin E-3.

Rate-Volume Controller

The Rate-Volume Controller is used to automatically control the rate of flow of air, gas, steam; and also oil, water and other liquids. Write for Bulletin E-5.



Positive Displacement Meter

Originated many years ago and still the standard measuring unit in the Gas Industry. Bulletin E-4.

Linderman Orifice Meter

A meter guaranteed to be accurate within 1 per cent—from zero to full capacity. Automatically controlled differential meter, maintaining a substantially constant pressure, recording and integrating the flow.

Laboratory Research

Tangible results . . . of practical as well as of theoretical value to Gas Measurement Engineering . . . are constantly being produced in the Erie Laboratory of the American Meter Co. Trained Engineers make *your problems their problems!*

Westcott & Greis Sales and Service

Whenever you have a Gas Measurement problem, call in a Westcott & Greis representative. He will gladly bring to its solution a personal interest, supported by extensive laboratory experiment . . . and of Gas Measurement experience practically applied in every part of the country. Our engineering counsel is yours entirely without obligation.

WESTCOTT & GREIS, Inc.
Sales and Service
2013 Santa Fe Ave., Los Angeles, Calif.
Telephone: TUcker 3296

SALES AGENTS
American Meter Company
Crosby Steam Gauge and Valve Co.
Taylor Instrument Companies
The Meriam Co.
Davis Regulator Co.
Laboratory Supplies

AMERICAN METER CO
MEASUREMENT ENGINEERS

WESTCOTT & GREIS
MEASUREMENT AND CONTROL

TULSA DALLAS HOUSTON LOS ANGELES

CROSBY

. . . . the name invariably found on valves and gauges where absolute reliability is demanded

Crosby Pressure Gauges

GAUGES manufactured by the Crosby Steam Gage and Valve Company have stood the test of time and live up to the definition of the word "gauge"—*"an accurate measuring instrument."* Accuracy is accomplished by mounting the pressure tube on the socket of the gauge rather than screwing it to the back of the case—the common practice in other makes. Eliminates inaccurate readings due to external strains on the case.

Crosby Recording Pressure Gauges

Employ the use of the Bourdon Tube instead of the helical spring, insuring longer life and greater accuracy.

Crosby Dead Weight Gauge Testers

Originated by Crosby years ago. Constant improvements have added to its efficiency.

Crosby Fluid Pressure Scales

An entirely new instrument designed to test gauges where pressure ranges exceed 1000 pounds. Manufactured in two types, one for pressures up to 2000 pounds and one for pressures up to 25,000 pounds. Exceedingly accurate, sensitive and ruggedly constructed.

Crosby Pop Safety and Relief Valves

An entirely new design in safety and relief valves, employing the use of a nozzle throat on the inlet side. Gives the valve much higher capacity, allowing the use of a smaller valve than heretofore. Made to operate to 1300 pounds and 900° F. Very desirable for use in cracking plants and stills for vapor relief. All parts subject to heat and pressure made of special steel alloys to resist corrosion.

Crosby Spring Seat Valves

Made of bronze for 250 pounds steam working pressure. Highly desirable for use on steam lines. Designed with replaceable seat and disc. Seat disc will not "wire draw."

Crosby Fullway or Boiler Blow Down Valves

Different from all other lever operated valves. Has double discs separated by a conical spiral spring causing contact with seats at all times. Self cleansing and can be installed with pressure on either side of discs with no leakage. Body fitted with male and female joints. Valve is operated by a simple lever, compound lever, or wheel. Operates where others fail.

Crosby Engine Indicators

Furnished for either gas, steam, Diesel engines, or ammonia compressors. Electrical attachments, cocks and reducing wheels also furnished.

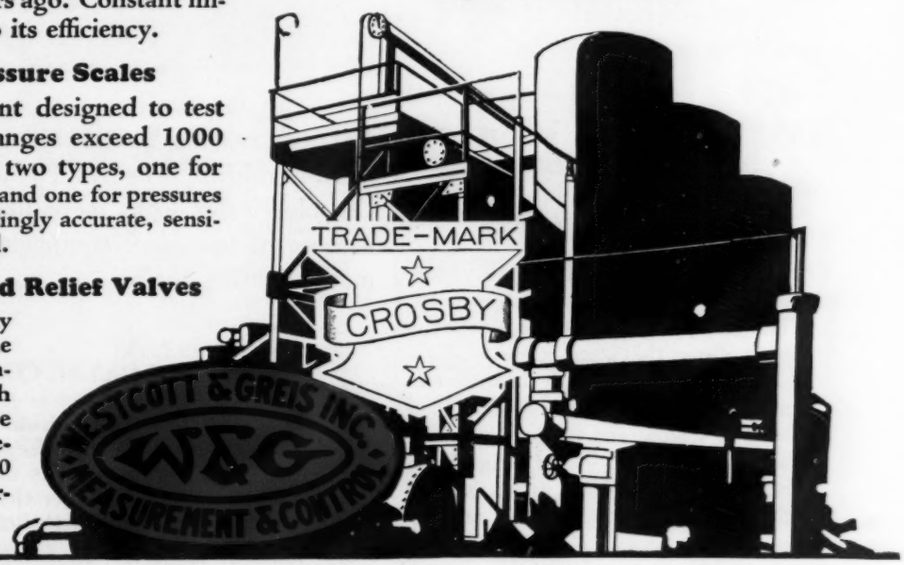
Our engineering counsel is yours entirely without obligation

WESTCOTT & GREIS, INC.

Sales and Service

2013 Santa Fe Ave., Los Angeles, Calif.

Telephone: TUcker 3296



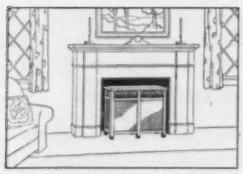
WESTCOTT & GREIS

CONSERVATION AND SAFETY

LOS ANGELES HOUSTON DALLAS TULSA

Now....

PAYNE offers...



IN FRONT of the fireplace, it gives instant, cheerful warmth—without kindling, coal, ashes, smoke, soot or smell! Gas fuel is quick, clean, sure.

Real Heating Luxury at low cost!

WARM AIR circulates into every nook and corner—fills the rooms with fresh, pure air, warmed to exactly the right temperature. Safeguards health!

A Console Heater *of Revolutionary New Design*

YOU KNOW the sturdy, quality construction of Payne Gas Furnaces. The new Payne Console Heater is built along the same scientific lines—quick-acting, multiple heating element of rust-proof ingot iron welded at all seams and joints—efficient, adjustable burner—double insulated casing, and superior, workmanlike finish throughout. Here is a cabinet-type heater you can *get back of* and push, and *push* and *PUSH!*

IN OFFICES, too, warm air is more healthful. The new Payne Console Heater looks more like a piece of fine office equipment than a heating device!

THE PAYNE CONSOLE HEATER fills a long-felt need—offering new *beauty and comfort* without extravagance—that spreads the heating load over ten to twelve months of the year. See it and you will agree that it gives you *all-season selling possibilities* no other heater designed for a similar purpose affords! *Full details on request.*

Payne

PAYNE FURNACE & SUPPLY CO., Inc.

Beverly Hills, California

There is a "Payne Heat" System for Every Building and Climate!

Payne Heat

Factory Units
Unit Furnaces
Floor Furnaces
Console Heaters
Central Furnaces
Pipeless Wall Units
Industrial Installations

Payne
Console Heater

RICH, "natural wood" finish gives it the outward appearance of a beautiful piece of furniture —takes up no more space than a sectional bookcase. Actually, it is a powerful heating plant that warms every portion of the room within a few minutes after it is turned on; nevertheless, its flat, smooth top remains cool . . . *always* . . . and may be used as a flower-stand or occasional table for bric-a-brac, goldfish bowl or water lamp!

Quick Facts-

1. Gas Heat is quick, clean, sure.
2. Heater cannot burn or scorch walls or rugs.
3. Double casing and insulation keeps top and walls cool to touch.
4. Warm air circulates in all parts of the room.
5. Easy to turn on by means of constantly burning pilot.
6. Concealed control valves are out of reach of children.
7. Rust-proof interior construction insures long life.
8. Scientific combustion and venting provides efficient, economical operation.
9. All welded seams prevent leakage of gas fumes into room.
10. Throws off no foul odor; warmed air is sweet, poor and healthful.
11. Easy to dust, polish and keep clean.
12. Artistic "natural wood" finish harmonizes with other room furnishings.
13. Serves as book shelf, flower stand or occasional table.
14. Takes up no more space than a sectional bookcase.
15. Instant warmth on chill nights during Spring, Fall and Summer months.
16. Solves your Winter heating problem in any climate!

Don't wait . . . Wire!

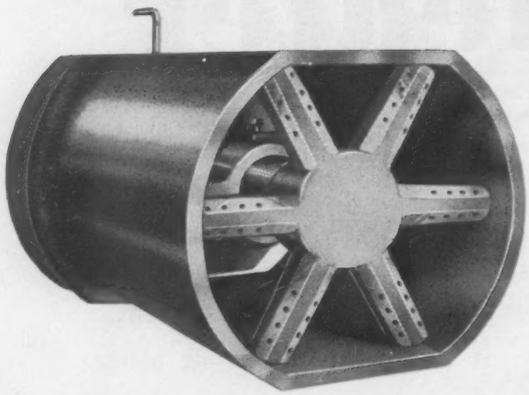
PAYNE FURNACE & SUPPLY CO., Inc.
Beverly Hills, California
There is a "Payne Heat" System for Every Building and Climate!

Payne Heat
Factory Units
Unit Furnaces
Floor Furnaces
Console Heaters
Central Furnaces
Pipeless Wall Units
Industrial Installations

JOHN ZINK COMPANY

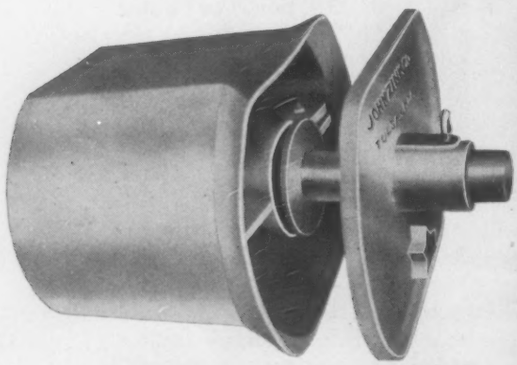
OKLAHOMA NATURAL GAS BUILDING
TULSA, OKLA.

GAS BURNERS



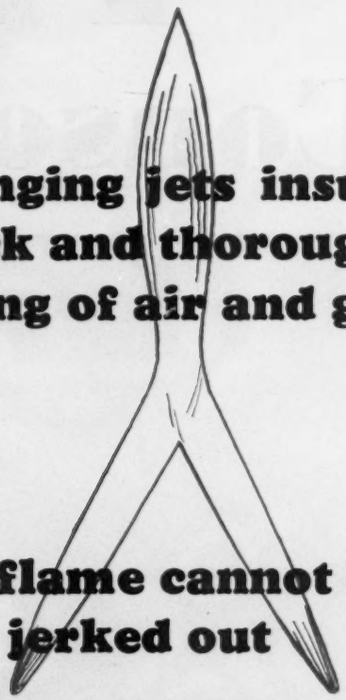
Red Star Gas Burner

Showing Radiating Arms of the Spreader So Drilled That Gas Jets Impinge Across Incoming Air for Combustion



Horizontal Bi-Mix Gas Burner

Burns Either Wet or Stripped Gas with a Short Flame. Is Not Damaged by Heat, Water or Oil.

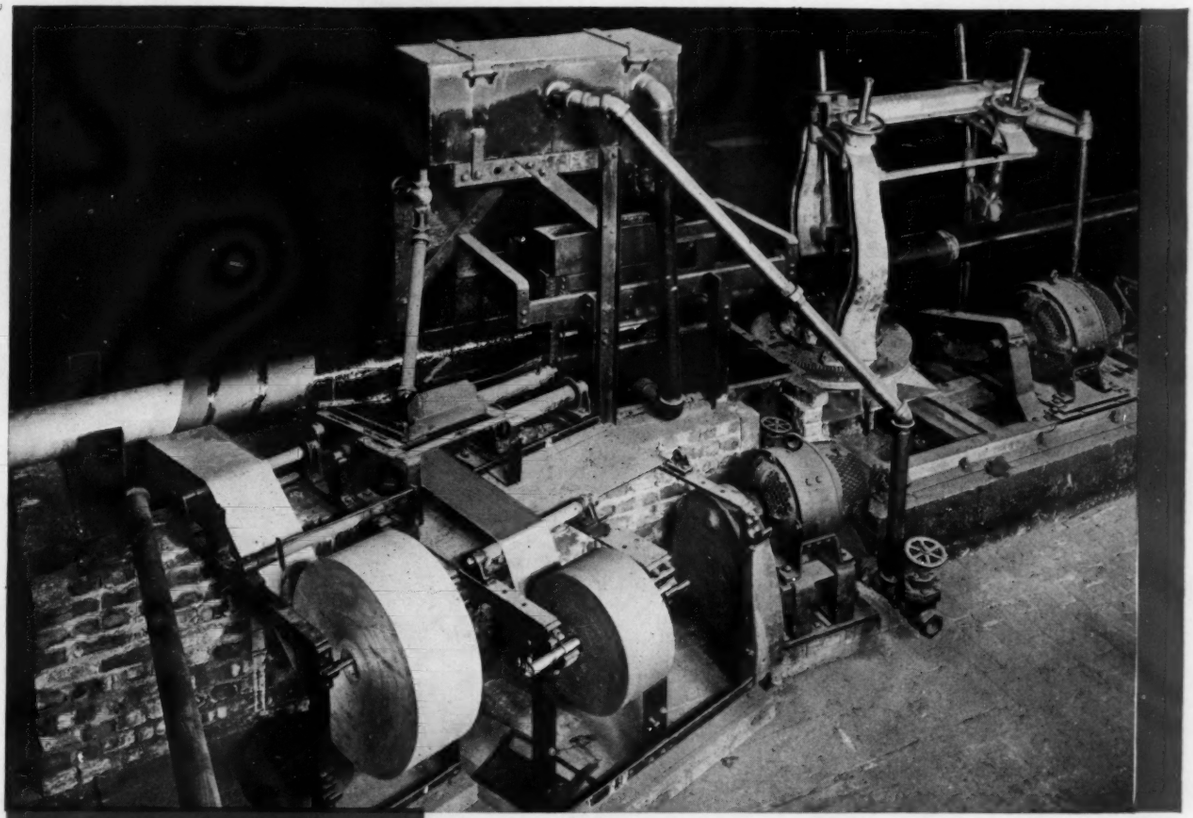


Impinging jets insure quick and thorough mixing of air and gas

This flame cannot be jerked out

Thirteen Similar Boiler Plants With One Company Equipped With Our Burners

The Coating and Wrapping is a continuous mechanical process. Felt and kraft applied under tension assuring precision of spacing.

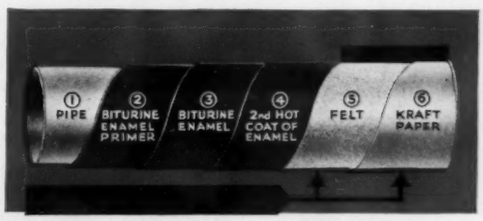


PROTECT

YOUR PIPE INVESTMENT AT THE TIME YOU ORDER YOUR PIPE

LINE PIPE is steel, and as such, is subject to corrosion — unless protected with a coating that is resistant to moisture, acids and alkalis.

Hand-coating of new pipe in the field offers but partial protection, and very expensive protection, to say nothing of the excessive cost of digging up old pipe lines, reconditioning and relaying them.



Felt and kraft wrapping are applied under tension

Stockholders in pipe line companies are looking for substantial dividends. They have every right to be disquieted if reports show great chunks gouged out of the profit columns to pay for frequent reconditioning of the pipe lines.

The time to protect the pipe is *before* the pipe is laid. Pipe purchased at the mills listed later, mechanically coated and wrapped *at the mill* by the Hill, Hubbell & Company Process, does away with all uncertainty, lowers the cost of pipe protection and brings the pipe to the field thoroughly armored against corrosion, ready for weld and backfill. The outer wrappings, applied under high tension, protect the enamel coating during transit and after the pipe is in the ground act as a mechanical protection against soil-stress. Pipe protected by the Hill, Hubbell & Company Process of mechanical coating and wrapping gives many years of uninterrupted and leak-proof service.

The Hill, Hubbell & Company Machine Coating and Wrapping Process was developed by the same group that has specialized for 23 years in protective coatings. Their plants are located in the following cities, for the production of the pipe manufacturers listed.

Central Tube Company.....Ambridge, Pa.
Spang-Chalfant & Company.....Ambridge, Pa.
National Tube Company.....Lorain, Ohio
A. O. Smith Corporation.....Milwaukee, Wis.
Youngstown Sheet & Tube Company
Indiana Harbor, Ind.
Youngstown Sheet & Tube Company
Youngstown, Ohio

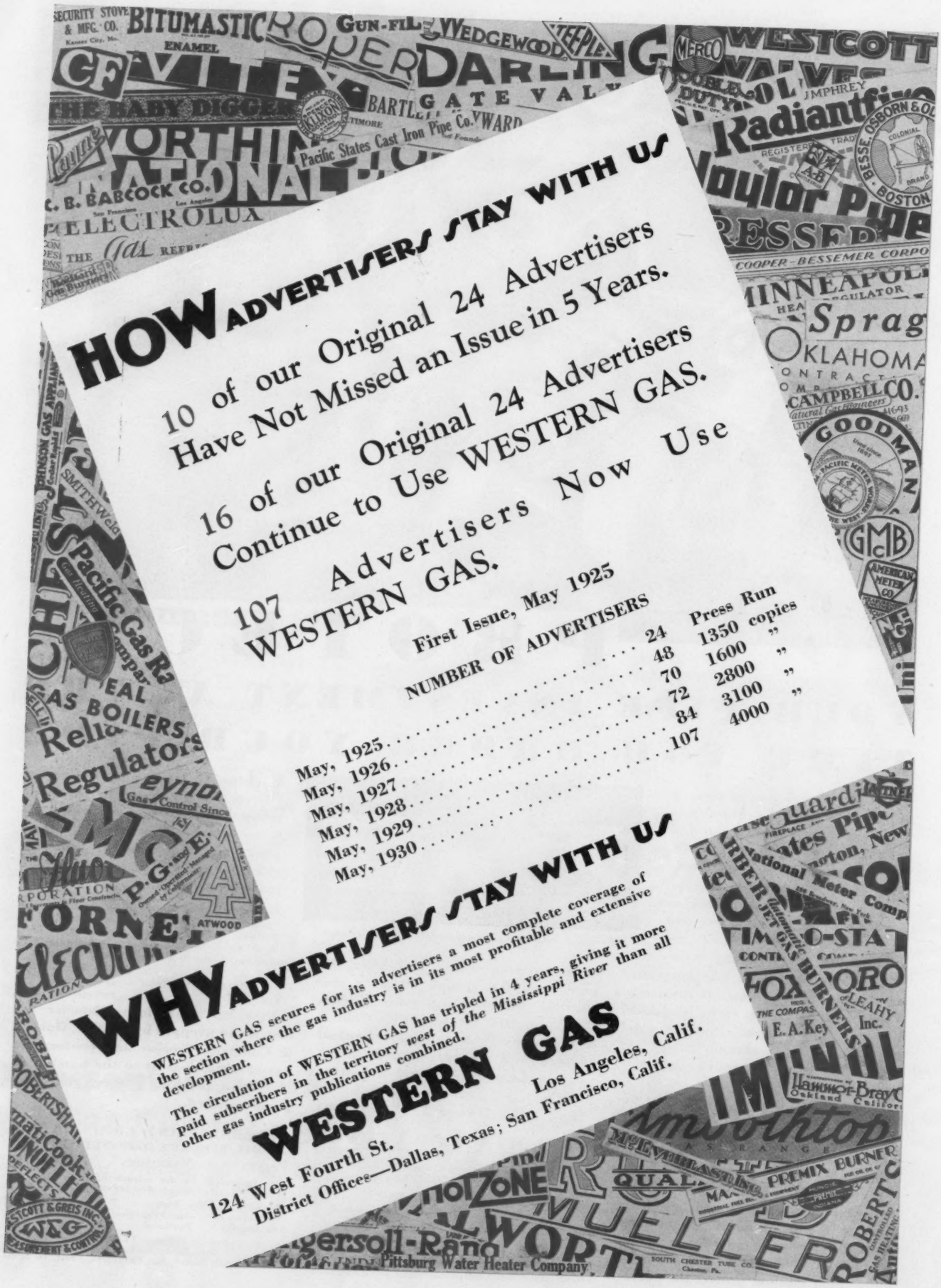
Pipe up to 24-inch diameter are coated and wrapped by the Hill, Hubbell & Company Process and conform to any specifications as to the number of machine-applied hot coatings and wrappings required.

BITURINE COATINGS

Biturine Enamel Biturine Solution No. 5
Biturine Enamel Primer Biturine 70-30
Biturine Coupling Mixture

Biturine Enamel and Primer are perfectly adapted to the Hill, Hubbell & Company Process of mechanically applying coating to the pipe at the mill.

GENERAL PAINT CORPORATION
HILL, HUBBELL & COMPANY DIVISION
PAINTS VARNISHES LACQUERS
Specialists in the science of protective coatings for industry
Chicago New York Tulsa Houston
Dallas San Francisco Oakland
Los Angeles Portland Seattle Spokane
Export Offices: 11 Broadway, New York, N. Y., U. S. A.
160 Fremont Street, San Francisco, Calif, U. S. A.

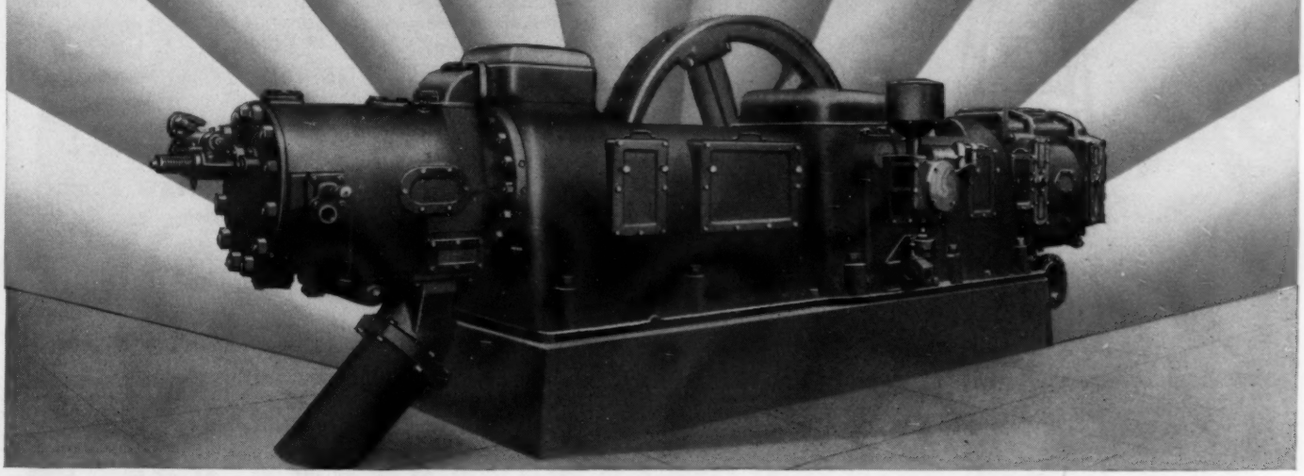

HOW ADVERTISERS STAY WITH US
10 of our Original 24 Advertisers Have Not Missed an Issue in 5 Years.
16 of our Original 24 Advertisers Continue to Use WESTERN GAS.
107 Advertisers Now Use WESTERN GAS.
First Issue, May 1925
NUMBER OF ADVERTISERS
May, 1925 ..... 24 Press Run 1350 copies
May, 1926 ..... 48 1600 "
May, 1927 ..... 70 2800 "
May, 1928 ..... 72 3100 "
May, 1929 ..... 84 4000 "
May, 1930 107
WHY ADVERTISERS STAY WITH US
WESTERN GAS secures for its advertisers a most complete coverage of the section where the gas industry is in its most profitable and extensive development.
The circulation of WESTERN GAS has tripled in 4 years, giving it more paid subscribers in the territory west of the Mississippi River than all other gas industry publications combined.
WESTERN GAS
124 West Fourth St. Los Angeles, Calif.
District Offices—Dallas, Texas; San Francisco, Calif.

COOPER-BESSEMER

TYPE 10

WHETHER you are a manager, operator, stockholder or superintendent — you are interested in seeing your plant operate at a profit — and that's exactly why these thoroughly engineered units win favor. Their low operating costs often mean the difference between a profit and a loss. Improvements in cooling, lubrication, cylinder head and piston make the new Type-10 a wise choice for any compressor work within its power range.

THE COOPER-BESSEMER CORPORATION
Formerly the C. & G. Cooper Company and The Bessemer Gas Engine Company
Mt. Vernon, Ohio Grove City, Pennsylvania
Branch offices in all principal oil and gas fields



2-CYCLE SIMPLICITY.
LOW OPERATING COSTS.
LOW MAINTENANCE COSTS.

FUEL ECONOMY.
FEWER SHUTDOWNS.
LOW INVESTMENT COST.

Now...

WEST COAST BUILDER Goes on the Air!

A New Sales Force Working for You!

HERE is the "missing link" in the building trades . . . . an authentic spokesman for contractors and building materials dealers . . . . talking directly to the owner . . . over the air!

Here is a new sales force working for you . . . putting you in touch with actual owner prospects . . . carrying on a persistent, constructive selling program that benefits the entire industry.

Every Monday, Wednesday and Friday, beginning March 17th, Radio Station K N X presents a new feature . . . the "Home Builders' Hour!" Well known building authorities discuss every detail in the construction of a typical western home.

These talks are lively, interest-compelling, entertaining . . . giving the prospective home builder valuable ideas on correct home planning, modernizing . . . pointers on materials, building codes, lien laws . . . a thousand-and-one things the modern home builder must know.

Listeners-in to similar programs in other cities have responded by the thousands. They have asked the names of dealers and manufacturers . . . which brands to use. . .

To new and old WEST COAST BUILDER advertisers: Here is the opportunity you have been looking for . . . to complete your distribution chain . . . to pave the way for greater sales . . . through the distributor . . . through the dealer . . . *to the ultimate consumer!*

A copy of the current issue of WEST COAST BUILDER containing complete, detailed information about each plan broadcast during the Home Builders' Hour, is being sent to every interested listener-in.

"Hook up" with this tremendous new selling force now. Your advertisement published regularly in West Coast Builder will insure 100% trade coverage . . . and in addition, you will receive the names of many hundreds of new owner prospects for your own individual follow up!

Watch for It! Listen to It!

HOME BUILDERS' HOUR!

EVERY MON. WED. FRI. 4:00 to 4:30 P.M.

Radio Station K N X

Cooperatively sponsored by West Coast Builder. Conducted for the benefit of the entire western building trades.

Advertisers: Act quickly! Here is a real sales opportunity for you. Reserve space. . . by letter or wire!

WEST COAST BUILDER

124 West 4th Street, Los Angeles, California

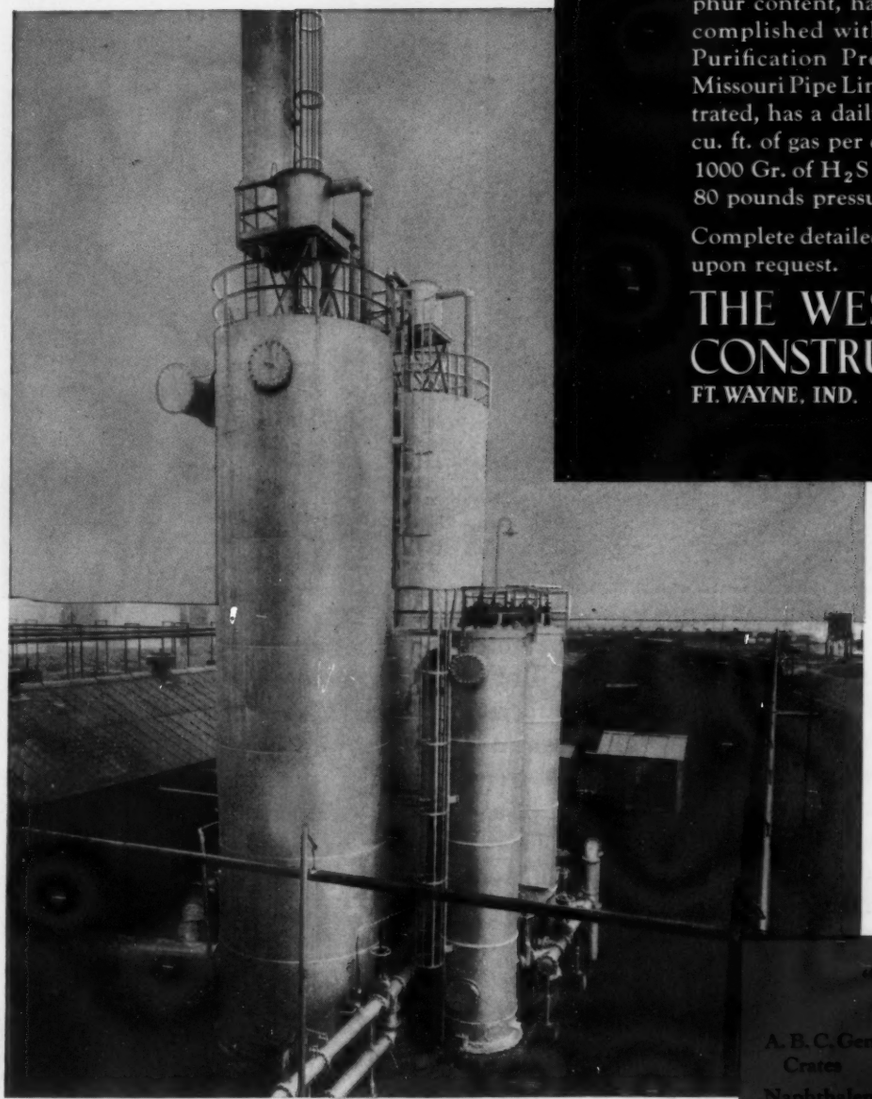
For PURIFYING oil refinery gases

The purifying of oil refinery still gases, under high pressure and with high Sulphur content, has been successfully accomplished with the Koppers Liquid Purification Processes. The Illinois-Missouri Pipe Line Company plant, illustrated, has a daily capacity of 6,000,000 cu. ft. of gas per day, the gas containing 1000 Gr. of H_2S per 100 cu. ft., at 50 to 80 pounds pressure.

Complete detailed information available upon request.

THE WESTERN GAS CONSTRUCTION CO.

FT. WAYNE, IND. *Subsidiary of* THE KOPPERS CO.



Purification Plant of the Illinois-Missouri Pipe Line Company at Wood River, Ill. 6,000,000 cubic feet of Refinery Still Gas purified daily.

"WESTERN GAS" *Designs and Builds*

A. B. C. Generator Crates	Holders (Gas, Oxygen, etc.)
Naphthalene and Gum Absorbers	Liquid Purification Plants
Condensing Apparatus	Oxide Boxes (Purifiers)
Carburetted Water Gas Plants	Welded Steel Pipe
Blue Water Gas Plants	Tower and Rotary Scrubbers
Gas Dehydration Plants	Valves

"They Made a Shop Job of Laying Pipe in the Field"

Rather a happy phrase this superintendent coined in stating his opinion of the SMITHWeld Expansion-Bending Joint as a Bending medium for Pipe Lines.

They had proved their value to him in making bends, with the simplest field equipment, to follow the contour of the country in the construction of a pipe line over an extremely rugged and mountainous region.

24,644 of these joints have been used by the oil and gas industry in the last two years.

A. O. SMITH CORPORATION—*General Offices:* Milwaukee, Wis.

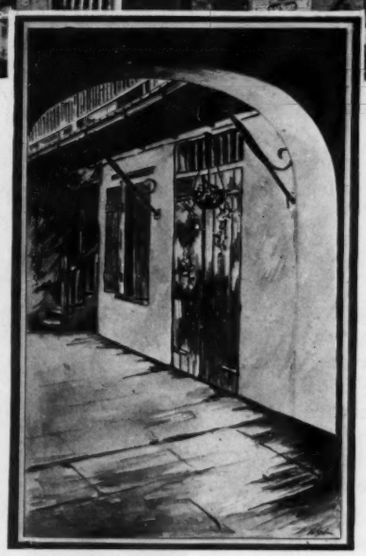
Oil & Gas Field Products Division

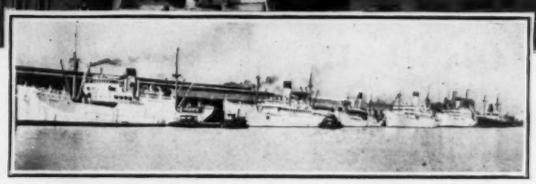
District Offices at: New York · Tulsa · Houston · Los Angeles

SMITH*WELDED* GAS LINE PIPE

America's Most Interesting City

WELCOMES YOU





NEW ORLEANS

fascinating city of old world charm and new world progress invites you to attend the

NATURAL

GAS

CONVENTION

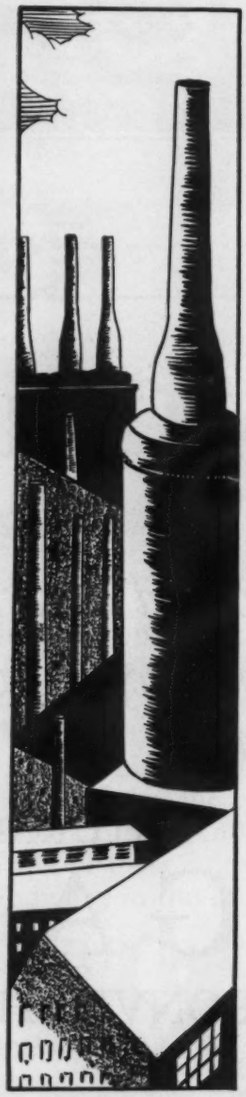
MAY 5 to 9—1930 NEW ORLEANS

New Orleans Public Service Inc.

A Modern Service of

NATURAL GAS

Increases Houston's Growth in Building, Shipping, Industry and Trade

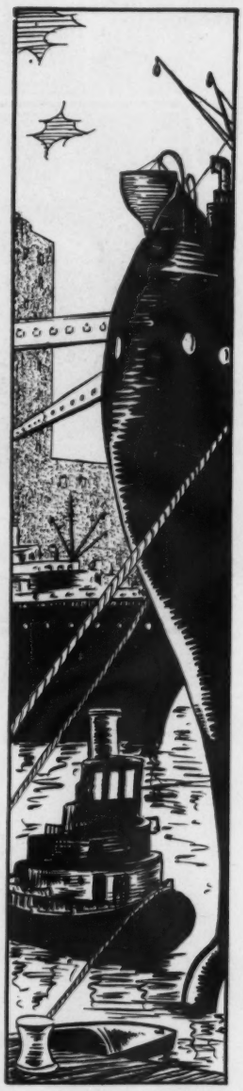


HOUSTON'S growth in the last four years has commanded the nation's attention. It has been due, in no small degree, to the modern and efficient service of natural gas which we have brought to its homes and industry.

Cheaper, cleaner, more efficient fuel has accelerated the pace of industry. More than 9,000 persons were added to the industrial payroll during the last year. It has stimulated the building trades . . . $100,000,000 in new structures in the last three years. It has added profit and convenience to manufacture . . . increased the volume of output that goes from the Port of Houston into the Seven Seas.

Our service of natural gas has added a vital factor to this natural concentration point of raw materials and natural resources . . . where water, rail, air and highway transportation are developed to a high degree . . . with rate advantages throughout the Southwest . . . and a plentiful supply of labor.

Here is a Land of Opportunity that combines industrial and commercial opportunity with pleasurable living. It is quite natural that Houston has become and will remain the largest market for natural gas in the Southwest.



HOUSTON NATURAL GAS COMPANY

Petroleum Building **Houston, Texas**

ANOTHER OUTSTANDING GAS LINE

Mississippi River Fuel Corporation adds to list of long distance Natural Gas Lines

FORD, BACON & DAVIS, INC.
Constructors
H. C. Cooper, *Engineer*

ST. LOUIS is the latest addition to communities now enjoying long distance natural gas. The new line of the Mississippi River Fuel Corporation, now serving this district, marks another step in the gradual extension of this convenient fuel into practically every section of the country.

This latest gas line project is over four hundred and fifty miles in length, including the main line and two principal branches, and in addition there are a number of smaller branch or service lines. The main line starts in the Richland and Monroe Fields in Louisiana and parallels the Mississippi River to a considerable extent on its way to St. Louis County. Construction involved eight principal river crossings—five creeks—four bayous and one lake, in addition to numerous smaller creeks and swamps, and finally the Mississippi River itself.

Obviously, a program of this nature required materials of unquestionable quality, particularly to meet the many difficult situations encountered along this line. Altogether in the main line, branches and service lines there are 365 miles of NATIONAL Pipe, varying from 22-inch to 3½-inch. Particular fitness to meet difficult situations is one of the reasons why NATIONAL is—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY • Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

S. N. G.

Natural Gas.....

The entire south joins New Orleans in welcoming the representatives of the natural gas industry to this section of the country. Your meeting will, no doubt, be profitable and enjoyable, first by the interchange of ideas and by partaking of the traditional southern hospitality in New Orleans, a city of charm and distinction.

When you prepare to return home we cordially invite you to stop in Birmingham and visit some of the large industries being served by this company.

The transmission system of the Southern Natural Gas Corporation consists of 500 miles of main line and approximately the same mileage of lateral lines. Industrial leaders believe that the availability of natural gas in this territory, already possessing many natural advantages, will mean a new era in the industrial progress of the southeast.

SOUTHERN
Natural Gas Corporation

Watts Building Birmingham, Ala.

No Matter What the Installation » » » REYNOLDS Has It » » »

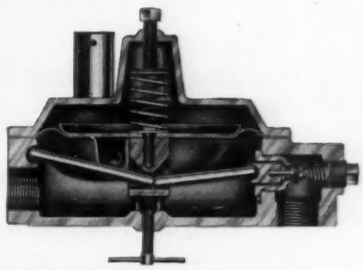
More and more Gas Engineers recognize the ability of REYNOLDS Units. Unsurpassed Gas Regulation at a minimum cost is an advantage to you. This is a characteristic of all REYNOLDS Units.

THE THREE SERVICE REGULATORS

Model O—the old standard—has successfully served for a quarter of a century. Model 10—all working parts are so accessible as to be interchangeable without removal from pipe line. Model 20—all working parts are so accurate as to permit complete interchangeability in the shop. The lever on both the Model 10 and the Model 20 is of Parkerized steel which prevents corrosion, and smaller lever bearing surface increases sensitivity.

REYNOLDS DISTRICT REGULATORS

These efficient units cut waste—control more effectively. They can be equipped with an automatic loader. When your gas consumption fluctuates, put a REYNOLDS Unit on the job —it controls uniformly.



The Little Giant will handle pressure up to 300 pounds to outlet pressure of 6 oz. to 2 lbs.

REYNOLDS PRODUCTS

for all kinds of Pressure Reductions —for either artificial or natural gas.

GOVERNORS—
- Intermediate Pressure
- Triplet Outlet
- Holder
- Toggle Type Street

REGULATORS—
- High Pressure Service
- Low Pressure Service
- Intermediate Pressure
- High Pressure Line
- Single and Double
- District Station

VALVE—
- Automatic Quick-Closing Anti-Vacuum

SEALS—
- Mercury
- Dead Weight

Reynolds Gas Regulator Company

Anderson, Indiana

Reynolds' Branch Office: Room 422, Dwight Bldg., Kansas City, Mo.

REPRESENTATIVES

F. E. Newberry, Avon, N. J. Eastern Service Company, Boston, Mass. Thos. C. Corin, Detroit, Mich.

NATURAL GAS

Fuel of Economy

FROM such widely separated gas producing areas as the fields of Coastal and Southwest Texas and those of North Louisiana and East Texas, the operating subsidiaries of United Gas Company, with estimated reserves of 539 billion cubic feet, are in a position to insure customers an unfailing supply of this economical fuel.

These operating subsidiaries are serving an estimated population of 1,141,000 people in East, South and Southwest Texas and Monterrey, leading industrial city of Northern Mexico.

Houston Gulf Gas Company
South Texas Gas Company
Dixie Gulf Gas Company
Southern Gas Company

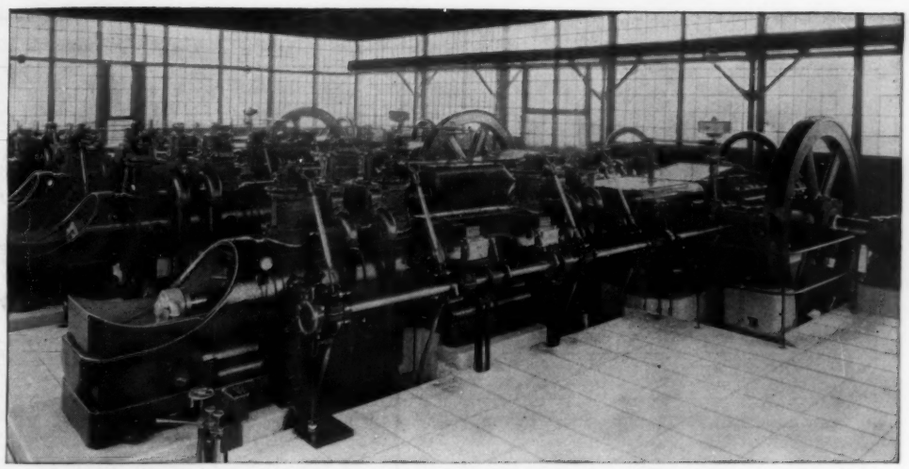
SUBSIDIARIES OF

·UNITED GAS COMPANY·

"Moody-Seagraves Management"

ESPERSON BUILDING HOUSTON, TEXAS

Worthington Gas-engine-driven Gas Compressors in the Guthrie, La., Station of the Memphis Natural Gas Company on the Monroe-Memphis Pipe Line. Installed by A. M. Lockett & Company under contract from Ford, Bacon & Davis.



7 facts . . . *about* Worthington Gas Engine Compressors

IN this day of booming natural gas projects, it is interesting to consider seven pertinent facts regarding Worthington Gas-engine-driven Gas Compressors:

1. Worthington is the oldest builder of gas engines in the United States. The first unit of this type of equipment was built for the Columbia Natural Gas Company in 1900.
2. Worthington gas engines now installed total close to 400,000 horsepower.
3. During the last four years, Worthington has furnished more than 100,000 horsepower in gas-engine-driven compressors for the natural gas pipe lines.
4. Over 50% of the gas-engine-driven gas compressors now in service are Worthingtons.
5. The low maintenance cost in Worthington-equipped compressor stations is a factor well-known throughout the natural gas industry. This is the result of good substantial design and careful workmanship, reflected in the ability to carry full load without effort.
6. Because of Worthington's established reputation for leadership in this field, prominent pipe line companies have felt justified in paying a higher price for Worthington Compressors than for competitive equipment.
7. Worthington, in collaboration with its associates, A. M. Lockett & Company, New Orleans, La., is in a position to build and equip modern compressor stations, complete in every detail.

Your inquiries are invited. *Ask for Bulletin S-550-B1.*

PUMPS
COMPRESSORS
Stationary and Portable
CONDENSERS
and Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL and
GASOLINE METERS
MULTI-V-DRIVES
CHROMIUM PLATING
Literature on request

WORTHINGTON

EGR-6

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N.Y. Holyoke, Mass.

Executive Offices: 2 Park Avenue, New York, N.Y.

GENERAL OFFICES: HARRISON, N. J.

District Sales Offices and Representatives:

ATLANTA	CHICAGO	DALLAS	EL PASO	LOS ANGELES	PHILADELPHIA	ST. PAUL	SEATTLE
BOSTON	CINCINNATI	DENVER	HOUSTON	NEW ORLEANS	PITTSBURGH	SALT LAKE CITY	TULSA
BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries

You'll be coming through our neck o' the woods

MOST of you who go to the New Orleans Convention will travel through some of our territory. Even when you step across to Juarez, you are on Lone Star ground. And we welcome you for a visit at any time you are passing through, either at Dallas headquarters, or any of our 266 cities and towns in Texas and Oklahoma.

You will know it when you get here, by the sparkling skylines. Some of our cities have run with natural gas for 20 years.

Old Chisholm Trail

It was 21 years ago that we started piping gas across the old Chisholm trail from Petrolia. As helpers in the development of the greatest natural gas belt in the world, we have been in the midst of the remarkable accomplishment the people of the Southwest have made during this fifth of a century. Today our system covers 3,500 miles of main line, supplied from a thousand wells in West Texas, the Panhandle and Oklahoma.

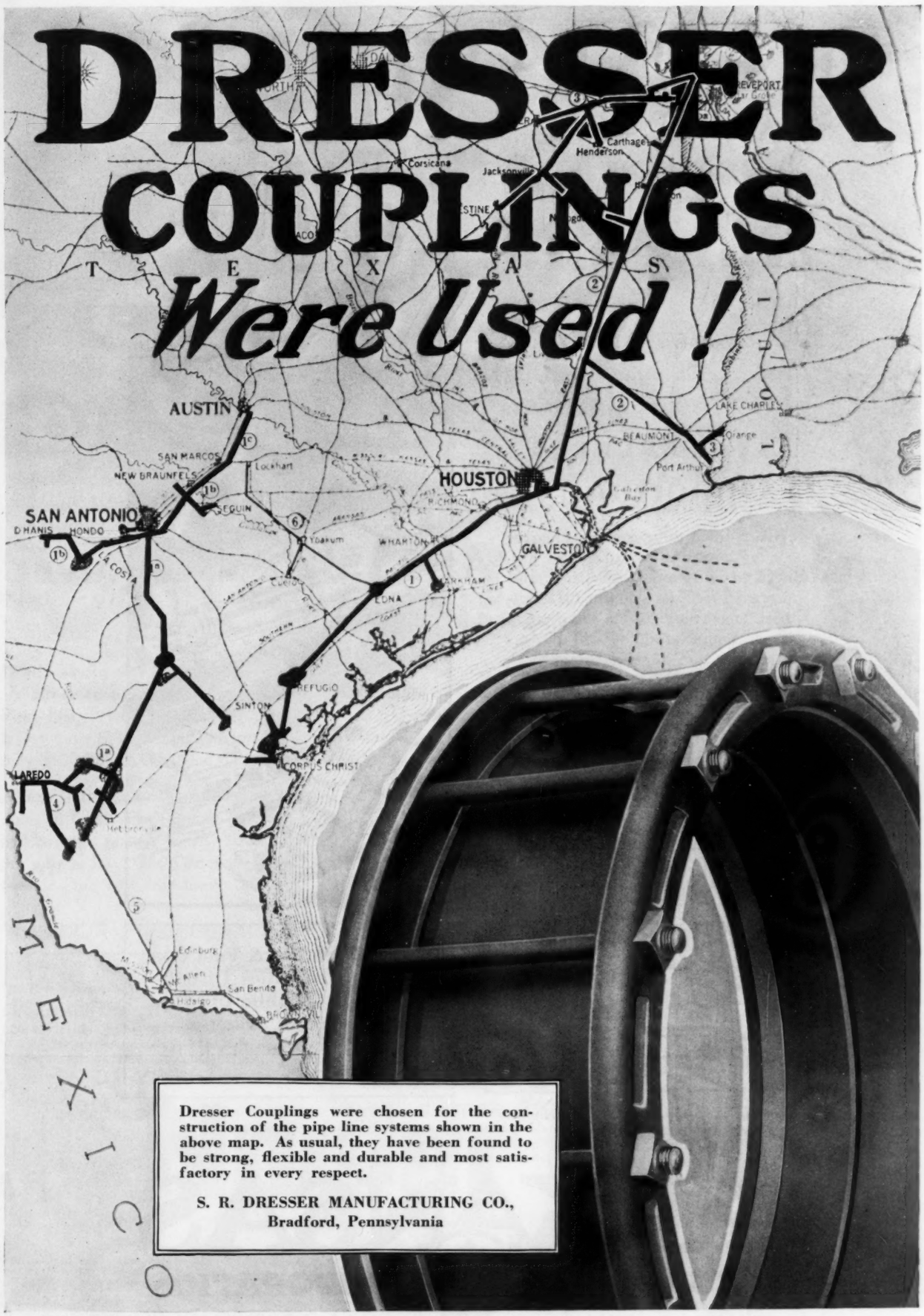
Not to be cramped by main line boundaries, we are now supplying automatic heat anywhere. . . . STARGAS, which is Lone Star gas compressed in steel cylinders. Some of our STARGAS customers live 30 miles from the railroad, but their Gas Refrigerators run just as merrily as if they were in the heart of town.

LONE STAR GAS COMPANY

Producers and Transporters of Natural Gas

DALLAS

DRESSER COUPLINGS *Were Used!*



Dresser Couplings were chosen for the construction of the pipe line systems shown in the above map. As usual, they have been found to be strong, flexible and durable and most satisfactory in every respect.

S. R. DRESSER MANUFACTURING CO.,
Bradford, Pennsylvania

Important Railroads *and* Splendid Highways

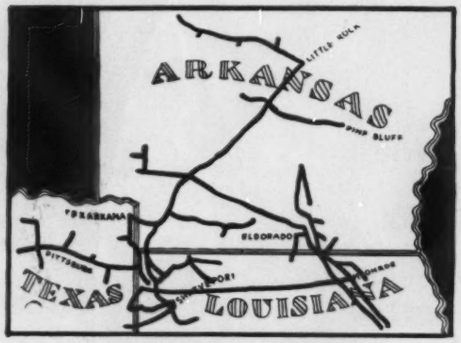
make distribution easy

in a Land of Industrial Opportunity

IN addition to an enormous market for numerous manufactured products in a virgin field, splendid transportation facilities augment the industrial opportunities in the section served with Natural Gas by this organization and its subsidiaries.

Manufacturing is the outstanding business opportunity in Arkansas, North Louisiana and East Texas.

It is the happy privilege of this institution to cooperate with the oil and gas interests in developing this great section.



Showing Pipe Line System of Arkansas Natural Gas Corporation

Little Rock Gas & Fuel Co. —Southern Cities Distributing Co.—Public Utilities Corporation of Arkansas— Arkansas-Louisiana Pipe Line Co.

ARKANSAS NATURAL GAS CORPORATION

General Offices, Shreveport, La.

A Cities Service Subsidiary

Laying a 14" Naylor Pipe line in uniform 40 foot lengths.

Saving $506.88 Per Mile In Laying Costs ....With Naylor Pipe

THIS saving was made by a large oil company on a 12" Naylor Pipe line, Victaulic coupled. The laying costs of the whole line totalled only $100.32 per mile.

A similar 12" line of standard weight pipe, 18 to 22 foot random lengths, had cost this same company $607.20 per mile to lay. *$506.88 more than Naylor Pipe had cost them.*

Naylor Pipe assures lower laying costs because of its light weight. It weighs one half as much as standard weight wrought pipe. Light weight pipe speeds up laying because it is so much easier to handle in the field. And ease of handling requires fewer men on the job. Less labor means lower costs.

As to the other economies of Naylor Pipe: When the total costs on the two lines were finally compared (from freight to "as laid in the ground") the results *showed a net saving of $2064.74 per mile on Naylor Pipe.*

The light weight of Naylor Pipe which is responsible for these economies is due to a spiralwelded lock-seam truss which provides maximum structural strength with minimum weight.

NAYLOR PIPE COMPANY, Main Office & Plant, 1230 E. 92nd St., CHICAGO

SALES OFFICES

25 Church St., New York
Witherspoon Bldg., Philadelphia
1209 First National Bank Bldg., Pittsburgh
507 Philtower Bldg., Tulsa
601 Post-Dispatch Bldg., Houston

DUCOMMUN CORPORATION
LOS ANGELES SAN FRANCISCO
Exclusive Distributors:
California, Arizona, Nevada and Utah

MONTREAL, CANADA
Mechanical Equipment Co.,
New Birks Building

TONCAN COPPER

Naylor Pipe

Maximum Structural Strength Mo-lyb-den-um With Minimum Weight

IRON

Standardized Naylor Pipe is made in sizes 6" to 12" I. D. and 14" to 20" O. D. in any uniform length desired up to 40' 0". Ends made to wrought pipe standards for all types of coupling.

Where corrosion is not a problem, Naylor Pipe can be furnished in steel.

Toncan Copper Molybdenum Iron is a development of Central Alloy Steel Corporation, the world's largest and most highly specialized alloy steel producers. It possesses a superior corrosion resistance, making it the favored pipe material.

All the HOT water you want
– no waiting, no bother
Instant hot water brings you sunlit hours of freedom
All the hot water you want—simply by turning the faucet!
Plenty of hot water, instantly, helps you finish the house work more quickly. It gives you 4 to 6 hours each week to spend with the children, to go motoring, or to go shopping.
And when you come home dusty and tired, what could be more refreshing than plenty of instant hot water!
To give you this fine hot water service, we simply install the Automatic Gas Water Heater in your basement, on your back porch, or in your kitchen. Once it is installed, there's never any delay or bother about an abundant supply of hot water — day and night.
This instant hot water service costs less per gallon than any other method of heating water in the home.
For full details about installing an Automatic Gas Water Heater, come into our office — or a dealer's store. Or if you like, just telephone and we'll have one of our representatives call and explain the many advantages of an Automatic Gas Water Heater.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians

Why do people buy *Automatic Gas Water Heaters?*

People first become interested in an Automatic Gas Water Heater because it gives instant hot water at the turn of the faucet.

A survey has proven that this appeal is 3 times more important than the "time-saving" appeal, which is next in importance.

So we feature the strongest appeal in the headlines of our water heater advertisements.

Other motives which cause people to buy automatic gas water heaters, are carefully woven into the advertisements sponsored by this Company.

The ad reproduced above is an example of the advertisements which this Company is running in the newspapers in an effort to create a larger market for you for automatic gas water heaters.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed
by Californians

CHROMIUM PLATED APPARATUS

for the

GAS INDUSTRY

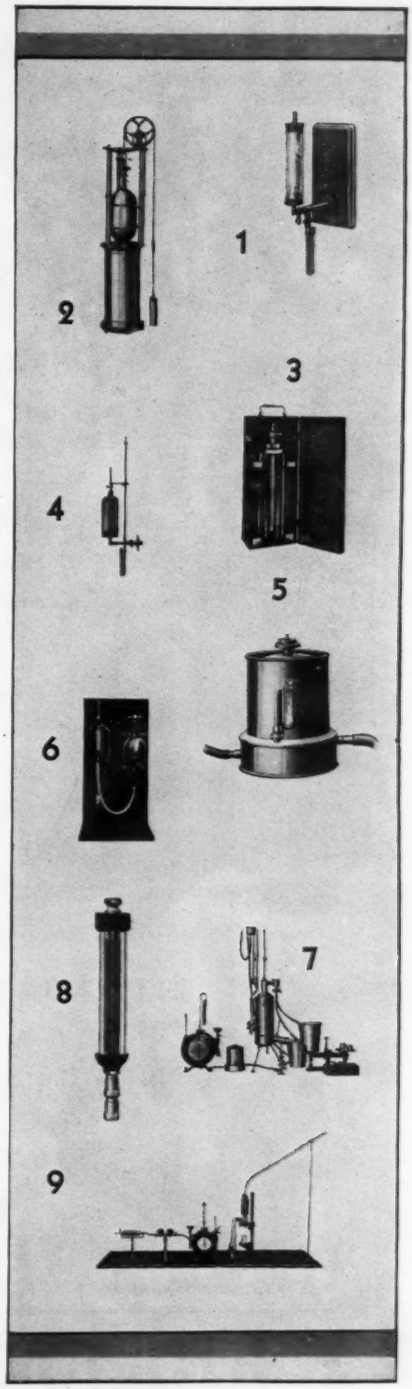
Chromium has proved its superiority over all types of plating that tarnish, stain, rust, corrode, wear or lose their lustre. Chromium plated equipment is now available to all users of gas apparatus.

Our protective plating is more than just a plate of chromium applied directly to the base metal. It is a triple plate first of copper, then nickel and lastly chromium. This produces a beautiful blue-white platinum-like color, the lustre of which is retained indefinitely.

Inert to sulphur and sulphur compounds, unaffected by atmospheric corrosion, chromium is the ideal plate and provides characteristics long desired by the consumer. Having longer wearing quality, and equal brilliance, chromium takes the place of nickel, silver, or platinum as a finish. No abrasives or polishing are required: simply wiping the surface with a damp cloth is all that is necessary to keep chromium plate bright.

Gas apparatus which may now be obtained in chromium plate is as follows:

1. Chimney Type Hydrogen Sulphide Test
2. Cubic Foot Bottle (Immersion Type)
3. Specific Gravity Apparatus
4. Young's Sulphur and Ammonia Test
5. Calorimeter Wet Governor
6. 1/10 Cubic Foot Bottle
7. American Calorimeter
8. Siphon Gauge
9. Referee's Sulphur and Ammonia Test



AMERICAN METER CO. MEASUREMENT ENGINEERS CUBIC FEET

AMERICAN METER COMPANY

Incorporated

General Offices: 105 West 40th St., New York, New York

Established 1836

SALES ALBANY · BALTIMORE · BOSTON · CHICAGO · DALLAS · DENVER · ERIE · KANSAS CITY

SERVICE LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · SAN FRANCISCO · TULSA

"For every joint on every line"

Ten miles or a hundred—Victaulic-coupled lines assure 100% delivery—because there are no joint leaks.

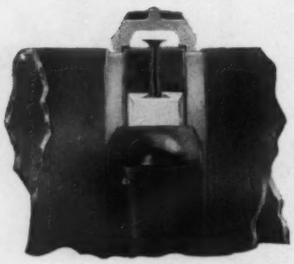
Installation costs are amazingly low.

. . .

Mail the Coupon for Victaulic Bulletin

For all sizes of steel, wrought iron, cast iron and spiral weld pipe—any pressure. Mail the coupon for detailed information.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York



"For every joint on every line"

FLEXIBLE LEAK-PROOF

VICTAULIC

REG. U. S. PAT. OFF.

PIPE COUPLINGS

VICTAULIC DISTRIBUTORS

Mid-Continent and Rocky Mountain
HANLON-WATERS. INC.
Tulsa, Oklahoma

Pacific Coast
DUCOMMUN CORPORATION
Los Angeles and
San Francisco, California

Western Pennsylvania
PITTSBURGH SUPPLY CO.
Pittsburgh, Pennsylvania

Eastern Pennsylvania
R. J. CROZIER & CO.
Philadelphia, Pennsylvania

Illinois, Indiana
BELL and GOSSETT
Chicago, Illinois

Ohio
CASE HARDENING
SERVICE CO.
Cleveland, Ohio

Minnesota, Wisconsin, Iowa
F. S. VAN BERGEN
Minneapolis, Minnesota

Canada
D. B. McWILLIAMS
Toronto, Canada

West Virginia and Kentucky
THE McJUNKIN SUPPLY CO.
Charleston, West Virginia

Tennessee
MILL & MINE SUPPLY CO.
Knoxville, Tennessee

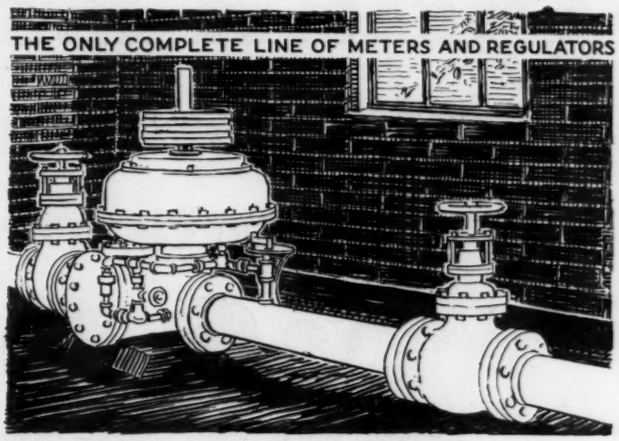
FOR OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

For uses, installations, specifications and prices, fill in and mail this coupon.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York
Please send me VICTAULIC BULLETIN NO. 6

Name.....

Address.....



WHEN THE PRESSURE IS LOW -EMCO BOOSTERS

Installation of EMCO Boosters eliminates the expense of having to increase the pressure at district regulator stations by hand during peak hours.

The EMCO Pressure Booster consists of a venturi section attached to the outlet side of the regulator. By making velocity changes through the venturi throat in combination with a Pitot tube—effective on the regulator diaphragm, the ratio of pressure and volume are automatically controlled.

EMCO PRINCIPLES

Removable Valve Box · One Piece Body Casting
Interchangeable Diaphragm Heads
Long Sensitive Diaphragm Stroke
Relatively Short Valve Stroke

EMCO METERS AND REGULATORS

PITTSBURGH EQUITABLE METER COMPANY

Main Office and Works—Pittsburgh, Pa.

New York City · Chicago, Ill. · Los Angeles, Calif. · Tulsa, Okla. · Dallas, Texas · Columbia, S. C. · Salt Lake City · Kansas City, Mo. · Seattle, Wash. · Houston, Texas

FISHER *INSURES*

Proper Seating of Regulator Valve Disc

The 205 Gas Pressure Regulator for house service—with Mercury Seal Relief Valve

More than two years ago, the FISHER laboratory set out to build a really perfect Gas Regulator.

The Regulator was given strength to stand abuse.

A channel was provided to catch foreign matter.

The diaphragm used is impervious to natural or artificial gas, a diaphragm that stays flexible through years of active service.

And, so that the valve disc will seat with absolute accuracy, FISHER attaches the valve disc holder to the diaphragm arm, with an adjustable valve post.

The valve disc is completely flexible in relation to the valve seat yet the disc is non-rotating. This superior feature is accomplished with special design ball and socket joint with compression valve spring to prevent rotation.

The new feature insures the valve seat contacting the disc at exactly the same angle and place, at all times. Positive shut off is assured.

Write for details.

Steam Pump Governors
[10 to 10,000 lbs.]
Boiler Feed Pumps
Fuel Oil Pumps
Vacuum Pumps
Receiver Tank Pumps
Pump By-Pass Valves
electric and power driven pumps
Reducing Valves, Pressure
Regulators
for all pressures—liquids, gases, steam
Differential Pressure Regulators
Strainers
pipe, suction and drip pocket
Liquid Level Controllers
direct and remote type
Hydraulically Operated Valves
Steam Traps—Air Traps—
Gasoline Traps—Grease Traps
Steam and Oil Separators
Vapor Pressure Controllers
for oil storage tanks
Boiler Gas Fuel Governors
Gas Engine Fuel Regulators
Automatic Gas Relief Valves
Gas Pressure Regulators
main and house service
Liquefied Petroleum Gas
Regulators
for gas cylinders
Gas Water Traps
Lever Valves
air, gas, or liquid
Float Valves
Fluid Mixers
Relief Valves
Back Pressure Valves
Vacuum Regulators
Drip Pockets
Exhaust Heads

The Fisher Catalog is the reference book for steam, water, air, oil, gas and similar fluid controls and related specialties—ask for a copy today. It deals with these products and 1,000 of similar nature.

FISHER

THE FISHER GOVERNOR COMPANY, Inc.

2400 Fisher Bldg.
Marshalltown, Iowa

"McEverlast Inspection Means Dollars in Our Pocket!"

"WE never worry about a job when McEverlast inspectors are watching it. That type of inspection means dollars in our pocket."

Coming from the construction superintendent of a large purchaser of pipe line coatings, such a statement means a lot. It proves that pipe-liners are understanding and appreciating the McEverlast ideal of service — to sell protection, not simply materials.

This inspection service is an important part of every pipe line job on which McEverlast protection is used. Pipe line engineers know that the value of even the best pipe line coating is greater when it is properly applied.

That this greater value may be assured to users of McEverlast protective coatings, specially trained inspectors are placed on every McEverlast job. McEverlast engineers will be pleased to consult with you on your pipe line problems. The coupon will bring you details of our inspection service with your copy of our illustrated pipe line booklet.

McEVERLAST, INC.
[INCO.]

111 West Seventh Street, Los Angeles, California

35 East Wacker Drive, CHICAGO, ILL. — 1754 Graybar Bldg., NEW YORK, N. Y. — 1314 Magnolia Bldg., DALLAS, TEXAS

OFFICES IN PRINCIPAL CITIES

Please send me your illustrated booklet and details of your inspection service.

Name.....

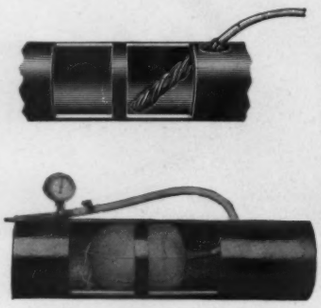
Address.....

City.....State.....

(W. G. May.)

— STOPPERS SINCE 1897 —

TYPE "C" CANVAS-COVERED GAS MAIN BAGS



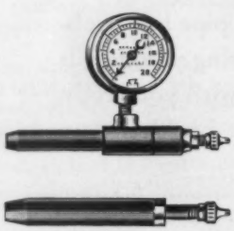
For use in mains coated with tar or oil or wherever a plain rubber will not hold.

SIZES 2" to 48"

DEPENDABLE GAS MAIN BAGS

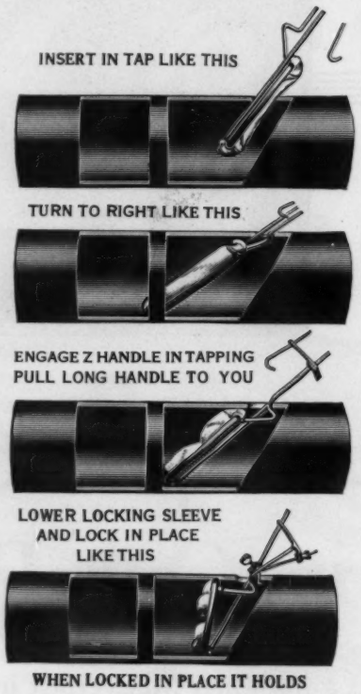
Made in three types:

Light—Type "A"
Medium—Type "B"
Extra Heavy—Type "D"



We advise the use of a gauge showing the internal pressure in the bag. It prevents over-inflation and shows that the bag is holding.

HOW TO USE THE GOODMAN STOPPER


INSERT IN TAP LIKE THIS
TURN TO RIGHT LIKE THIS
ENGAGE Z HANDLE IN TAPPING
PULL LONG HANDLE TO YOU
LOWER LOCKING SLEEVE
AND LOCK IN PLACE
LIKE THIS
WHEN LOCKED IN PLACE IT HOLDS

Takes only 30 seconds.

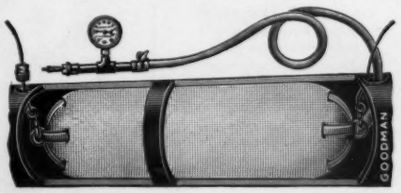
Patented Locking Sleeve
Holds Stopper firmly in place.

GAS SAMPLING BAGS

On trial if you wish

GOODMAN CYLINDRICAL STOPPER FOR INTERMEDIATE PRESSURE

To place and inflate requires less than one minute.



Patented

Increased Length for Increased Pressure

AIR-LINE MASK

With or without blower. Heavy harness and life-line if needed.

SPRING-HEEL PLUG

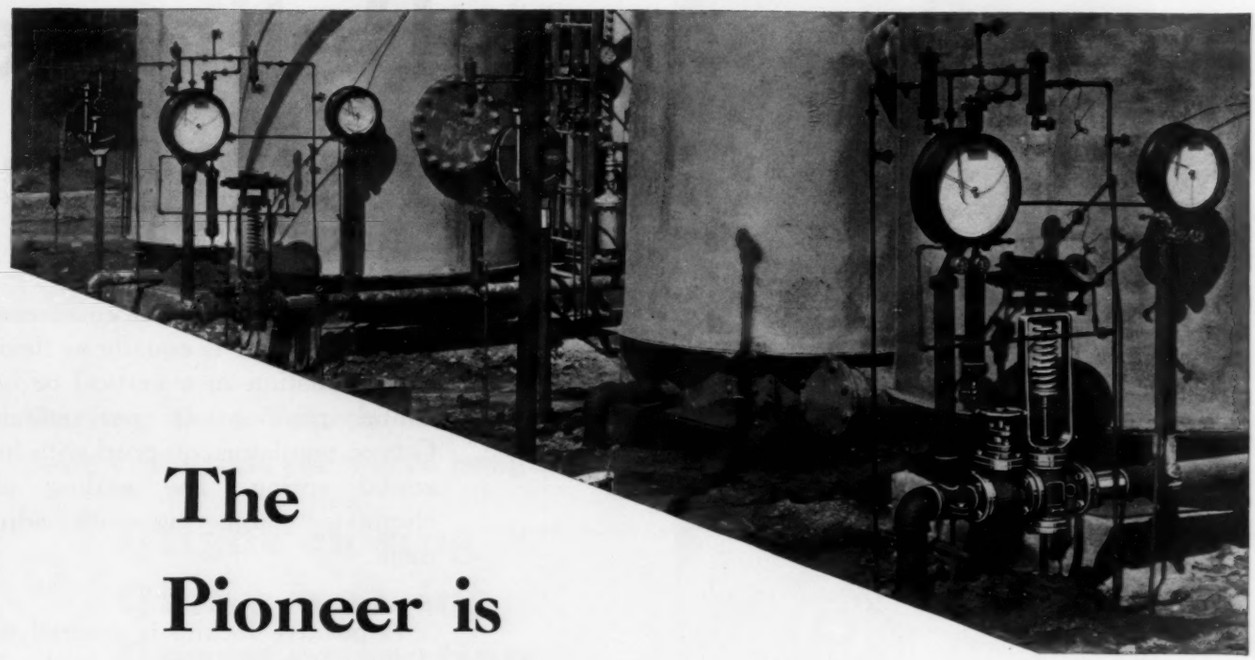
Type No. 6 for right angle fittings.

Type No. 7 for 45° fittings.

Other Plugs for Various Uses

Safety Gas Main Stopper Company

523 Atlantic Ave. **Cable Address** **Gastopper, N. Y.** Brooklyn, N. Y.



Foxboro Flow and Temperature Recorder-Controllers in a gasoline plant at Little River, Oklahoma.

The Pioneer is Still the LEADER

Flow Control was pioneered in 1924 by Foxboro. Today over 1100 dependable fool-proof Foxboro Flow Controllers are successfully stabilizing industrial processes.

Oil Producers and Refiners throughout the world use Foxboro Controllers. They have saved thousands of dollars and untold trouble for themselves. **What they have done you can do.**

The Foxboro Flow Controller is a controlling orifice meter. It combines the accuracy of the Foxboro Orifice Meter with the dependability of Foxboro Air-operated "Flapper Valve" Control.

In design and application of Controlled Valves for Flow Control, Foxboro is years ahead. Foxboro V-Port Valves are half the story on Flow Control. Write today for Bulletin 167-G—"Foxboro V-Port Controlled Valves."

FOXBORO
REG. U. S. PAT. OFF.

The FOXBORO COMPANY

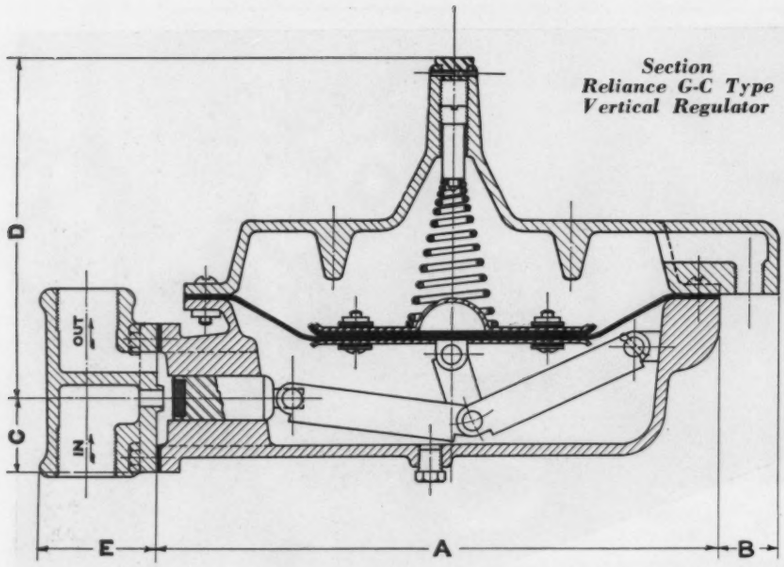
Neponset Ave., Foxboro, Mass., U. S. A.

Western Offices:
Los Angeles, 443 S. San Pedro St.
San Francisco, 461 Market St.
Portland, Ore., 816 Lewis Bldg.

J. E. Tracy, Strada Golesti No. 9, Ploesti, Roumania
New York, Chicago, Philadelphia, Pittsburgh, Rochester, N. Y. Detroit, Boston, Atlanta, Tulsa, Cleveland, Dallas, Salt Lake City.
Peacock Bros., Ltd., Montreal, Canada.

Agents for Robinson Patented Orifice Flange Fittings

Instruments for Controlling, Recording and Indicating Temperature, Flow, Humidity and Pressure.

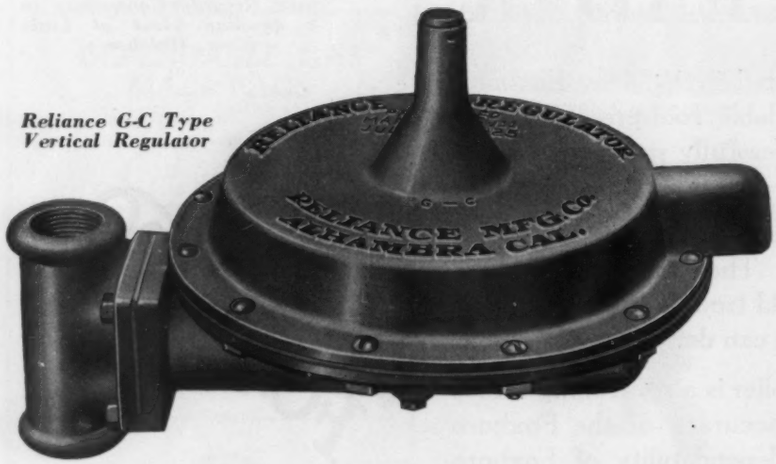


Section
Reliance G-C Type
Vertical Regulator

Reliance Regulators

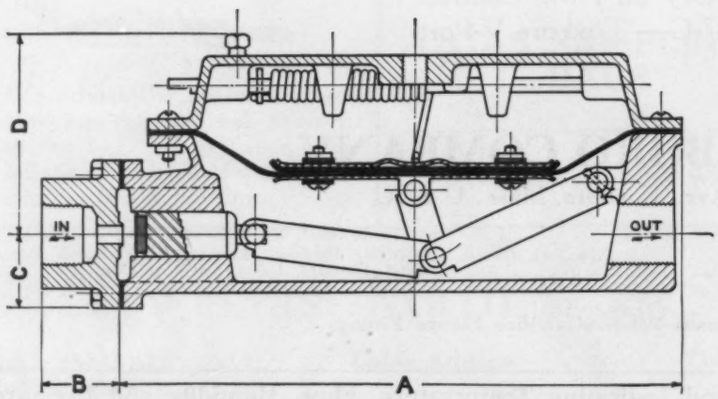
Reliance G C type compression spring regulator is equally as flexible for installation in a vertical or horizontal position as our standard G-type regulator equipped with horizontal spring. The sealing plug eliminates tampering with adjustment.

A positive lockup is assured with Reliance toggle action mechanism which has been proven through years of service. Double outlets can be provided in either type, which when tied together increase the capacity 60% over single outlet connection.



Reliance G-C Type
Vertical Regulator

The valve orifice casting can be removed by taking out the four cap screws and the valve seat is then accessible for inspection. Another feature in this respect is that orifice valves can be changed in size in event inlet operating pressures should change. A 7/16″ orifice is recommended for inlet pressures under ten pounds; from ten to thirty pounds the 5/16″ orifice and for any higher pressure the 3/16″ orifice.



Section Reliance No. 1-G Type Horizontal Regulator

Reliance Manufacturing Co.

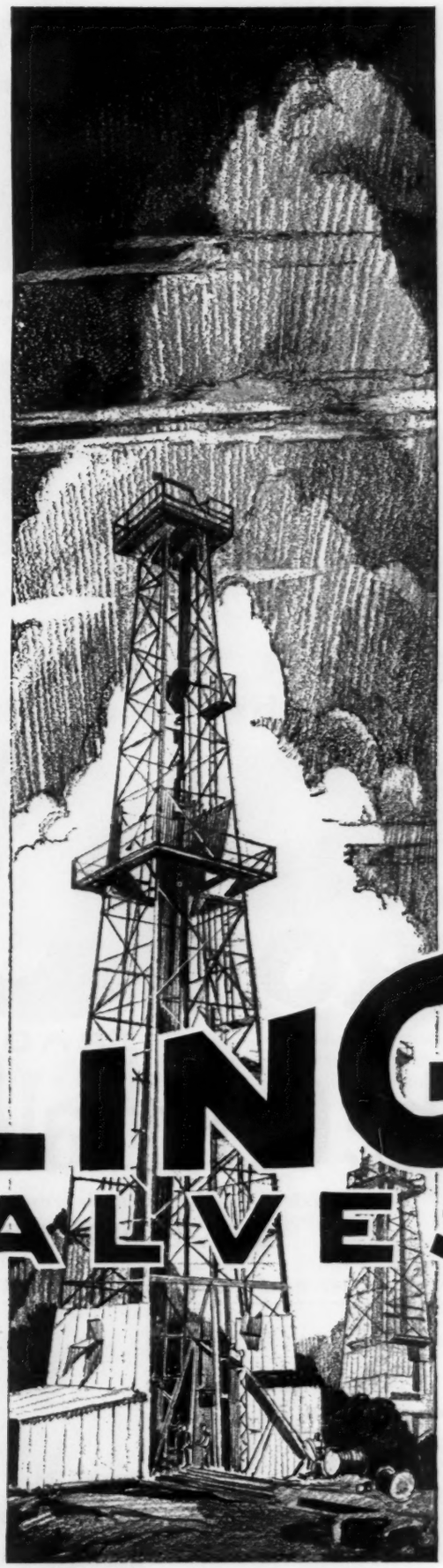
1000 Meridian Ave., Alhambra, Cal.

Isbell-Porter Co., Newark, N. J.; Westcott & Greis, Inc.; Tulsa, Okla.; Dallas, Texas; Houston, Texas; Birmingham, Ala.; N. W. Gas & Electric Equipment Co., Portland, Oregon.

Darling Gate Valves embrace the four essentials for valve usage, i.e.

¶ tight closing
¶ long wearing
¶ easy operation
¶ ready repair

Darling Valves can be counted upon for year in and year out service. Efficient, dependable, yet at a cost but slightly more than ordinary valves.



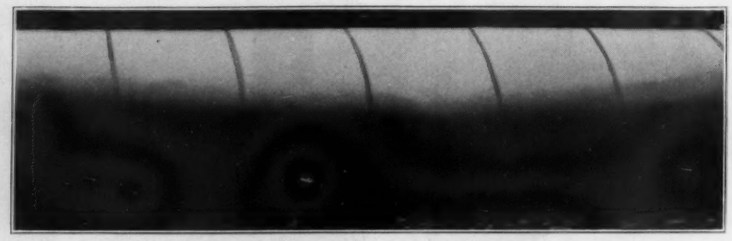
DARLING GATE VALVES

Darling Valve & Mfg. Co.

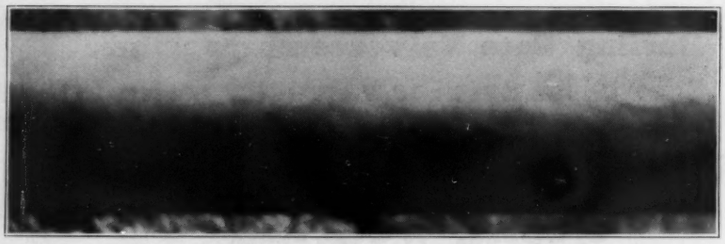
Williamsport, Pa.

New York Chicago Oklahoma City Houston

First—Applying NO-OX-ID to line, brush method. May also be applied by hand.



Second—NO-OX-ID-IZED wrapper applied over film of NO-OX-ID. Note uniformity.



Third—NO-OX-ID Service Coat applied over NO-OX-ID and NO-OX-ID-IZED wrapper.

The Last Word in Pipe Line Protection
The One That Never Fails

NO·OX·ID

IRON + OX = RUST

TRADE MARK

The Original Rust Preventive

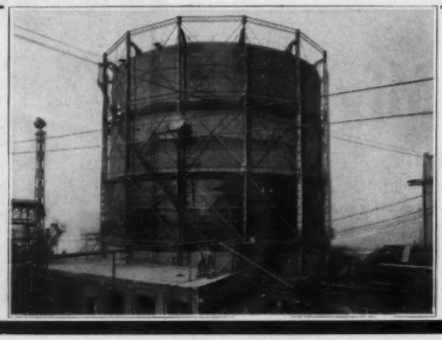
Ask Your Dearborn Representative or write us for full particulars

DEARBORN CHEMICAL COMPANY

CHICAGO

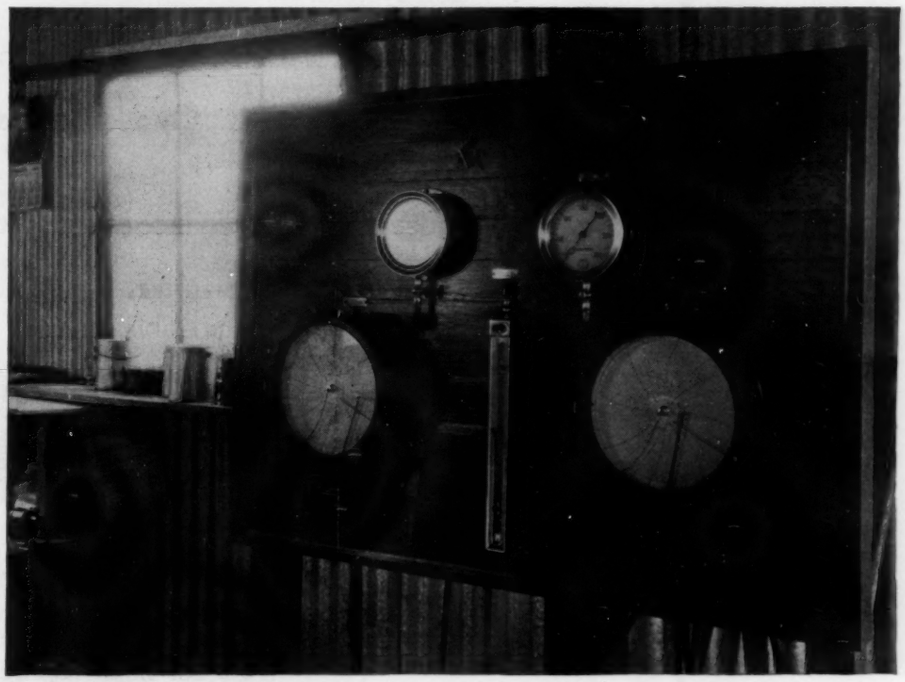
LOS ANGELES—807 Mateo Street, Phone TRinity 3385 SAN FRANCISCO—252 Spear St., Phone Davenport 658

"NO-OX-ID Treated Steel is Always Steel"



Thoroughly Protects Your Gas Holders

More than 1700 Bristol's Recording Gauges..



SHOWN in the accompanying illustration are two of the more than 1700 Bristol's Recording Gauges used by a large Mid-Continent Gas Company. These particular instruments are installed in connection with a Gas Booster station, to provide permanent chart records of incoming and outgoing pressures.

Such records tell at a glance just how efficiently the station has been, and is being operated—serving both as a guide for workmen in maintaining suitable main pressures, and as a reliable source of information for the Distribution Superintendent.

Bristol's Recording Gauges can be furnished with single or multiple penarm, upright or inverted type. The inverted type Model 11-M Gauge has been developed especially for use where exposure to moisture, dust, fumes, etc., is unavoidable, and is an ideal instrument not only for indoor use, but outdoors on pipe line, storage tanks, at wells, etc., etc.

Operating records compiled over a period of years prove conclusively that these sturdy, simply designed instruments have the ability to "stand up", and remain accurate under all ordinary field conditions.

But get more detailed information. Write our nearest branch office. Competent Engineering Service will be placed at your disposal—without obligation.

The BRISTOL COMPANY, Waterbury, Conn.

Boston
New York
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Birmingham

BRANCH OFFICES:

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747 Warehouse St., Los Angeles
Boatmen's Bank Bldg., St. Louis

Chicago
Detroit
Akron
Denver
St. Louis

6 reasons why it pays to aftercool gas

1— It eliminates internal corrosion and deterioration of all physical equipment on the distribution system.

2— It eliminates drips and drip pumping.

3— It eliminates practically all trouble with service regulators.

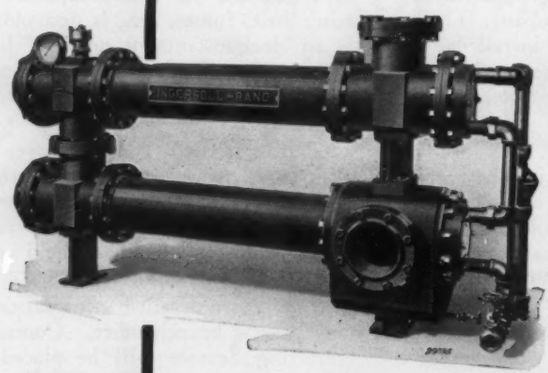
4— It decreases maintenance of the system.

5— It cuts down complaints to a minimum, thereby giving the best possible service.

6— It insures longer periods of service for meters before being brought in for routine tests, as well as more accurate registration by meters in service.

The above advantages of dehydrating gas for high-pressure distribution are taken from a report by one of the subcommittees of the American Gas Association. If we were permitted to suggest a seventh reason, we would add that dehydration pays because of the high efficiency of the new Ingersoll-Rand Class "M" Aftercooler. May we send you detailed information?

INGERSOLL-RAND COMPANY
1460 E. Fourth Street
Los Angeles, Calif.



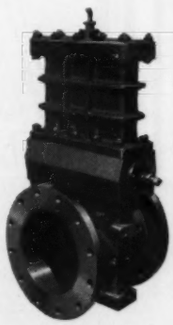
These coolers need little space, and operate practically without attention.

984-C

Ingersoll-Rand

HOW THE MODERN ORIFICE FITTING CUTS PIPELINE MAINTENANCE COST ....and provides accurate metering

When Robinson engineers introduced the first Robinson Orifice Fitting, some five years ago, they brought to the oil and gas world the first practical solution for one of the industry's biggest problems . . . the urgent need for a greatly simplified and less expensive method of changing orifice meter plates, as well as housing the equipment compactly. Although the first fitting was developed to a high degree of perfection before it was ever placed on the market, Robinson Orifice Fittings have since been so continually improved that today they represent the utmost in efficiency and economy.



The Complete Robinson Orifice Fitting. Ready for Installation. Note its compactness and simplicity.

Thousands of Robinsons In Use

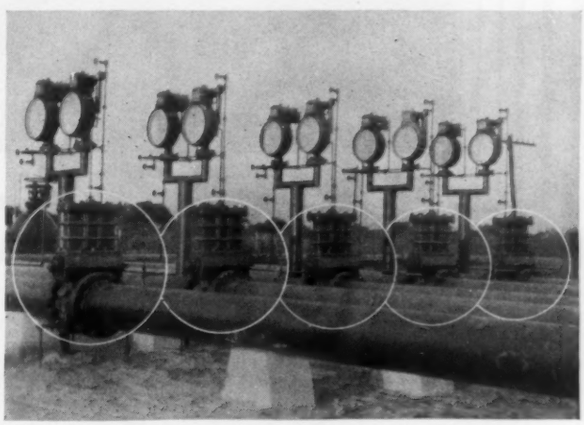
That they produce very definite advantages for pipeline owners is convincingly shown by the fact that nearly 12,000 are now in use and all of them giving excellent service on every kind of pipeline where orifice measurement is necessary.

Paramount among Robinson features is the elimination of the cumbersome by-pass with the heavy expense attendant to that method of metering. Equally important advantages are found in the ease and economy with which the fitting can be installed and the plate . . . removed for frequent inspection or micrometer checking or the orifice . . . or replaced. All of these operations are accomplished without interruption of the gas-flow.

Ease of Installation

Just compare the installation of a Robinson Fitting and one of the old-style set-ups. The latter was usually hauled to the location on a two-ton truck . . . accompanied by three or four man with pipe and fittings. A meter man made a separate trip to install the gauge. In short, a six-inch meter installation required the services of two trucks, a foreman, meter man, truck driver and three laborers.

Here's the Robinson method. One man hauls the complete set-up in a small car and installs it, without help, in a very short time! Quite a difference in cost . . and the larger the set-up the greater the saving.



Ten-inch Robinson Fittings installed by The Southern Gas Co., San Antonio, Texas.

Other Robinson Advantages

These two economies alone make it virtually indispensable for any orifice installation that measures gas, oil or water . . . and it has many additional features that all contribute to better service and lower maintenance cost. It effects big savings in the cost of materials, for example, because it eliminates the valves, tees, ells, couplings, flanges, pipe, etc., used on the old type set-ups . . . it simplifies and speeds up changes because the plate does not have to be removed from between two flanges (3 to 15 minutes will do the job.)

Accurate Metering Assured

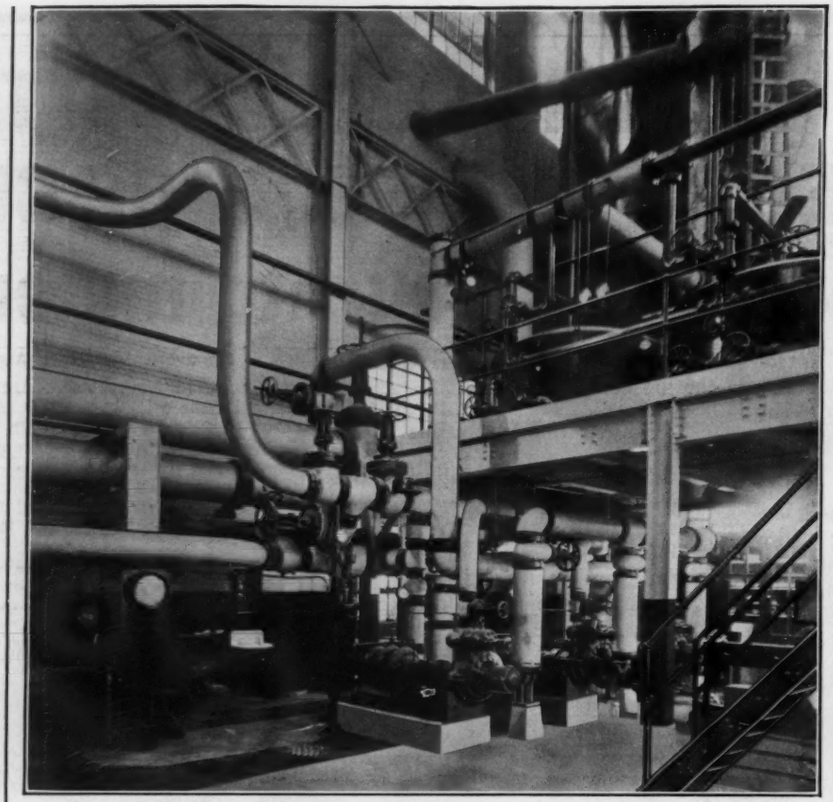
Errors in measurement are prevented because the orifice is *always centered* . . . and because no gas or oil can leak by the fitting but must all pass through the orifice to be correctly measured. There is no by-pass valve to stick open—nothing to get out of order. Even plate changing is done with little or no gas loss, no hazard and no waste.

The entire Robinson Orifice Fitting occupies no more space than an ordinary gate valve or pressure gauge . . . and it can be mounted in almost any position. Taking them all in all, Robinson advantages combine to produce the most accurate of metering at the lowest cost . . . no matter whether you figure it by the year, by the number of changes or by initial and maintenance costs on individual installations!

Robinson Orifice Fittings are made in sizes ranging from 2″ to 20″ to function at working pressures of from 100 to 500 pounds. An illustrated catalog, describing in great detail the various working parts and their functions, the easy installation and efficient operation of Robinson Orifice Fittings will be sent to you without charge, on request. Simply write to the Main Office at Los Angeles, or any one of the following distributors: The Foxboro Company, Dallas, Texas and Tulsa, Oklahoma; or Westcott & Greis, Inc., Dallas, Texas and Tulsa, Oklahoma; English distributor, Walker, Crosweller and Company, 54-58 Queen Elizabeth Street, London, S. E. No. 1.

ROBINSON ORIFICE FITTING CO.

1435 Santa Fe Ave., Los Angeles, California



ATWOOD

Piping for Field and Refinery

SINCE its first welded piping installation in 1908 (still in operation), the ATWOOD pipe Fabrication Department has ever been on the alert to meet more fully the fundamental requirements of Oil and Gas piping systems, in Field and Refinery. These requirements are reliability, accessibility, reduction of deterioration to a minimum, and incorporation of the most advanced engineering knowledge to maintain the highest operating efficiency for the service intended.

All these requirements are met to the highest degree in the installation partially illustrated above, one of the newest and largest blast furnace and coke plants in the country.

Many of our customers rely entirely upon ATWOOD Service not only for the fabrication of a piping system, but also for its design and installation. Why not profit by their experience? "He gains wisdom in a happy way who gains it by another's experience."

PITTSBURGH VALVE, FOUNDRY & CONSTRUCTION CO.

PITTSBURGH ~ PENNA.

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Boston, Mass. .....185 Devonshire Street
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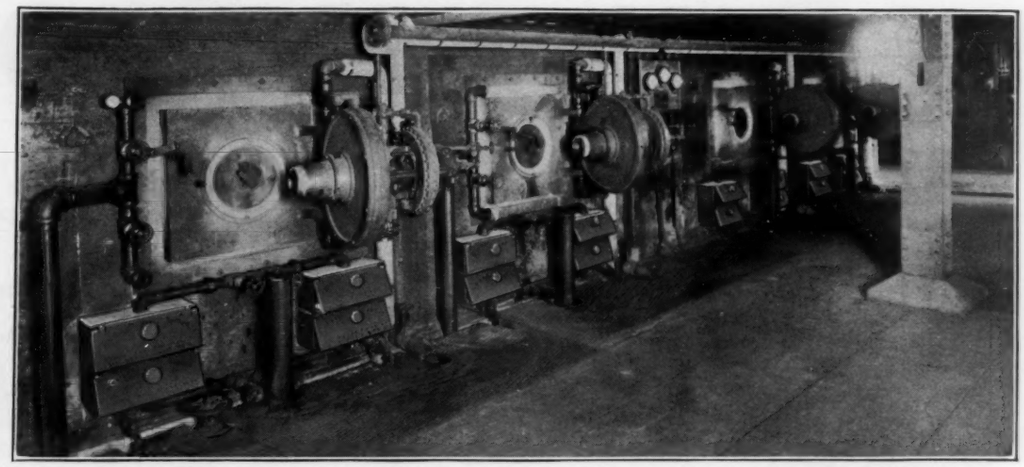
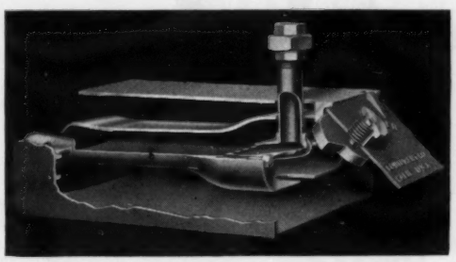
Philadelphia, Penna. .....R. J. Crozier Co., 10 South 18th Street
Los Angeles, Cal. .....John G. Bell Co., 712 East Sixth Street

VALVES · WELDED PIPING · FITTINGS

Industrial Leaders



of the West install N. G. E.



Gas Burners!

Some Representative Users of N. G. E. Gas Burners:

PACIFIC GAS and ELECTRIC CO.

Potrero plant — *San Jose plant*
Oakland plant — *Fresno plant*
Sacramento plant — *Stockton plant*

Illustration at top shows two 585 h. p. Stirling boilers in the Potrero plant, each equipped with eight N.G.E. Type A burners. This plant utilized the first natural gas to flow through the new 22" pipe line from Kettleman Hills to the San Francisco area.

AMERICAN CAN COMPANY
San Francisco

FELICE & PERRELI CANNING CO.
Gilroy

SAN FRANCISCO PACKING CO.
San Francisco

SOUTHERN CALIFORNIA GAS CO.
Los Angeles

STANDARD SANITARY MFG. CO.
Richmond

SUN MAID RAISIN GROWERS
Plant No. 4 . . . Fresno

OUTSTANDING industries of the West...quick to see the advantages of natural gas, the most perfect fuel known...have been equally quick to take advantage of the long experience and engineering research that have combined to produce N. G. E. Gas Burners *Type A*... built by the West's first manufacturer of efficient gas burning and control equipment.....

N. G. E. Gas Burners *Type A* were adopted in one plant to get increased output from boilers already available, and make the purchase of steam from outside plants to meet peak loads unnecessary.

Another plant saved more than the cost of gas fuel and burner installation in drying kilns because products of combustion were free from soot and did not soil material being processed...

Another made substantial savings by automatic control features of N.G.E. Gas Burners and Wilgus Regulators...

So runs the story . . . a hundred different problems..one solution: N.G.E. Gas Burners and N.G.E. engineering service to cooperate in finding the best application for each particular plant...

NATURAL GAS EQUIPMENT INC.

Petroleum Securities Bldg. Los Angeles — *1123 Harrison Street* San Francisco — *311 East Second St.* Tulsa

Please send me . . . no charge or obligation . . . "21 Gas Burner Problems and Their Solutions"

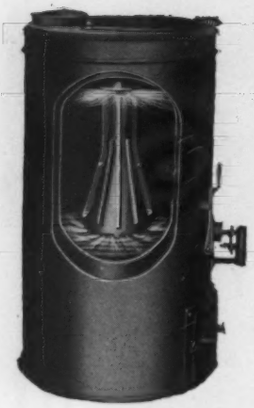
Name _____

Company _____

Address _____

"Western Gas, May 1930"

Every Well Kept Home Can Now Have One



The SECO is an incinerator within the reach of every home owner. It is well built and efficient. 2½ bushel capacity. Large enough for any family.

The low price on the Improved SECO Home Incinerator means quantity sales for every gas company that handles it.

The illustration shows the large cone at the center and the burner. Notice the flame at the bottom, and the baffle plate that spreads a flame at the top. This double flame makes quick, complete combustion. The garbage and refuse burn both at the bottom and the top. The double flame burns all smoke and odor.

SECO

Improved Home Incinerator

Highest Quality Yet Low Priced

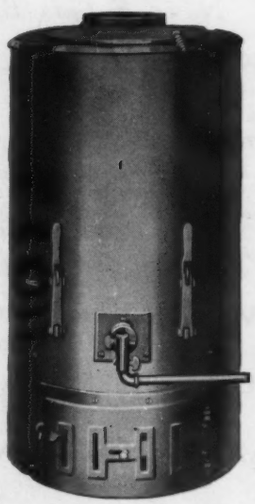
Specifications

Height, 38 inches.
Diameter, 21 inches.
Flue collar, 7 inches.
Manual visible pilot light.
Capacity, 2½ bushels.
Colors of red and black, or aluminum and black.

Quickly lighted with intermittent pilot light. As easily installed as a gas range and requires no more servicing.

There is a growing demand for the improved Seco Home Incinerator. The low price, high quality and satisfactory service are the reasons for this demand.

Every family that uses gas for fuel needs an incinerator.



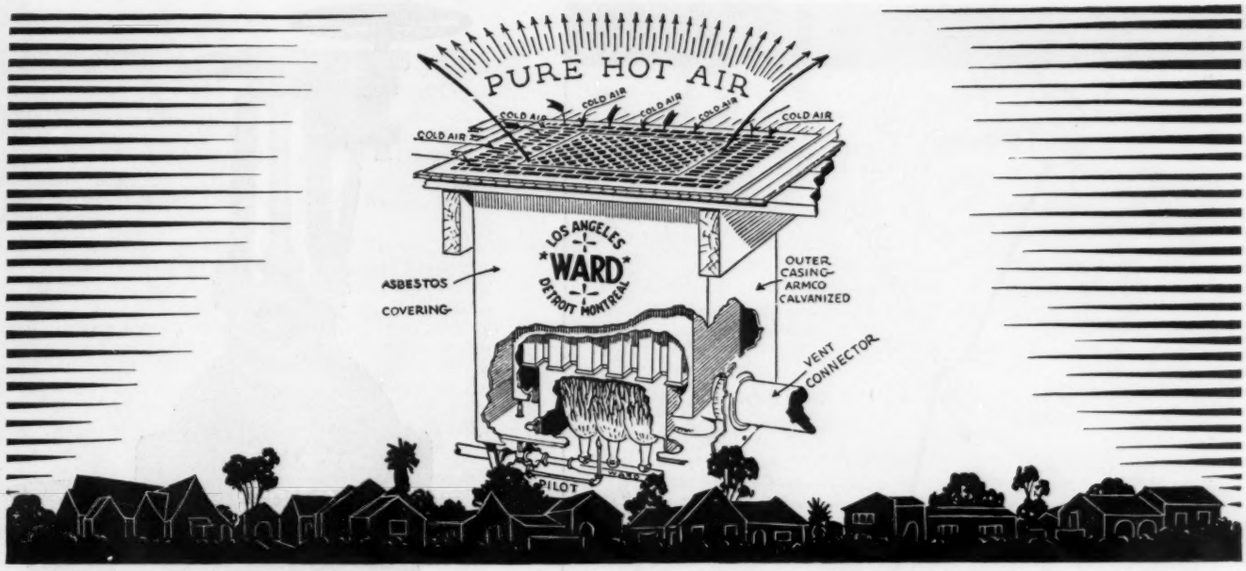
Gas companies can increase their sales of incinerators and add to their profits by handling SECO Incinerators.

A size and type for every need—chimney fed types, basement types, outdoor and industrial types constructed of brick.

Write for literature and details covering requirements.

Seco Incinerator Co.

2307 Grand Ave. **Kansas City, Mo.**



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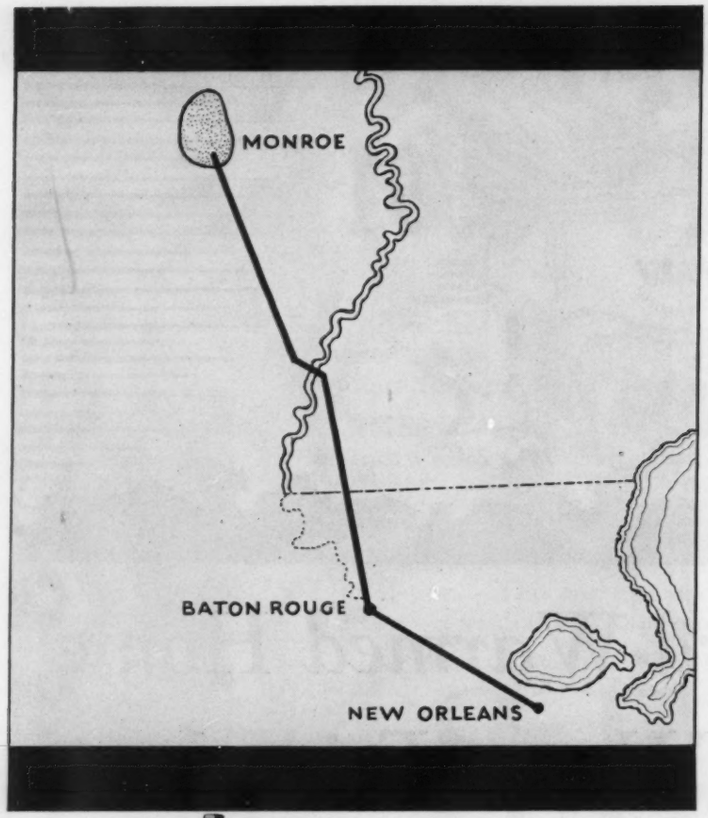

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OFFICIAL PUBLICATION: THE PACIFIC COAST GAS ASSOCIATION; SOUTHERN CALIFORNIA METER ASSOCIATION

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A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

SAN FRANCISCO **LOS ANGELES** **DALLAS**

Natural Gas... *Unique* Among *the* Nation's Utilities

By ED. C. CONNOR

Consulting Engineer
Dallas, Texas

BECAUSE the "natural" branch of gas service is still formative, its structure changing spectacularly on many fronts, and steadily on all, it is difficult to achieve a perspective of what is actually taking place. Perhaps it is fitting, as the Natural Gas Department's New Orleans convention marks off another yearly interval in the industry's evolution, to look back along the road already traveled. Mr. Connor here contributes an interesting chapter to the natural gas chronicle, from which the reader may build up a well-defined sense of direction for the future.—*Editor.*

ONE of the most interesting phenomena of American business history has been the recent growth of the natural gas industry as a public utility enterprise. During the past few years the transitions that have marked this growth, have taken place with accelerated rapidity and have quickly transformed a business, hitherto confined to limited areas, into one almost national in its scope. It is safe to say, that, at this time, no other field of investment has so fired the imagination of the American public, as that afforded by the capital requirements of natural gas pipe line construction into new and widely extended markets. This public participation in natural gas financing has been the result of changes that have taken place within the past five or six years. The factors that have entered into these changes have ceased to be matters of interest only to those definitely connected with the industry, and have become matters of interest to an ever expanding group whose sole contact with the business has been brought about through the purchase of its securities. It is the writer's purpose to present a brief non-technical resume and discussion of this transition which has given natural gas the status of a national enterprise.

As late as 1910 natural gas service was available to a relatively few centers, fortunately located in reference to the developed sources of supply, then largely confined to the western section of Pennsylvania and West Virginia. At that time, there was nothing in the situation that indicated any potential growth for the business, and the previous decade had witnessed the actual abandonment of service in some districts that had hitherto been supplied.

Oil Search Yields Gas Reserves

Following the intensive oil development in the West and Southwest, particularly in California, Texas, Oklahoma and Louisiana, a gradual change in the aspect of the natural gas business began to take place. Wholly incident to a search for oil, gas reserves were discovered in widely scattered locations in each of these states, and even these earlier and limited tests indicated the existence of probable sources of supply greatly in excess of those upon which the industry had hitherto depended. However, in most of the areas in which these discoveries were made, economic conditions were not particularly conducive to rapid development and utilization; there were few large urban centers from which to secure substantial domestic markets; the distances from the fields to such markets as were available, were comparatively great; the possibility of securing large industrial markets, such as existed in the highly developed Ohio valley, was wholly lacking, and local capital was reluctant to seek investment in a type of enterprise concerning which it had neither technical nor practical knowledge. These deterrents did not apply with equal force to the situation in California. but the isolated character of that market effectively prohibited the possibility of the extension of service in any direction other than north and south.

Despite the unfavorable features that the Southwestern markets presented, several groups of men, previously associated with the natural gas industry in Ohio, West Virginia and Pennsylvania, with the optimism so characteristic of those engaged in the oil and gas business, began the construction of pipe lines to the larger distribution centers, comparatively close to the proven areas of gas production. This initial development provided service to a substantial portion of Oklahoma, eastern Kansas, north central Texas, northwestern Louisiana and southwestern Arkansas.

No Path of Roses For Pioneers

The experience of these pioneers, during the decade from 1910 to 1920, was not such as to excite the cupidity of outside capital. The vast natural gas resources of the Southwest, as we now know them, were at that time latent and undefined. At a date as late as 1919 the major companies serving Kansas, Oklahoma and north central Texas, were with difficulty meeting the seasonal demands of their comparatively limited markets. Quite naturally a situation of this sort offered no incentive for the development of new markets, and the natural gas pipe line construction of this period was very largely confined to extensions made for the purpose of bolstering a supply that was rapidly becoming inadequate.

In the natural gas industry it is a rather difficult matter to maintain a *status quo*. In the matter of gas reserves it is usually a case of feast or famine, and at about the time the United States entered as a participant in the World War, natural gas companies, as a whole, and particularly those operating in the mid-continent area, were on very short rations. Something had to happen if the business was to maintain itself, and fortunately for those who had risked their capital in it, something did happen. Stimulated by the extremely high prices for oil that prevailed during the war period, the wild-catter proceeded to puncture the remote areas of the Southwest and, in so doing, furnished the natural gas operators with the benefits of explorations and discoveries that the economic limitations of their own business effectively prevented them from making on their own account. Gas was discovered in large volume, incident to the search for oil. The Monroe and Richland fields of Louisiana, the Ranger field of central west Texas, the fields of south central Oklahoma, and at a later date, the tremendous reserves of the Texas Panhandle, and of the vast section of Texas lying south and southwest of San Antonio, were successively made available—and this was not all. The production of casing head gasoline was extremely profitable at this time, and absorption plants were constructed at strategic locations in the fields. A vast number of wells producing gas in small quantities, along with oil, were tied into these plants, and this process concentrated, at given points, a large supply of gas that otherwise would have been unavailable for pipe line purposes.

The situation was now reversed. The problem that confronted the gas companies had previously been that of procuring an adequate supply. It now became one of developing an adequate market. These vast resources even when doled out at a rate infinitesimally low compared to their potential current capacities, provided the basis for major extensions into new markets, despite the fact that the areas originally served had grown by leaps and bounds in both population and industrial development. The financial situation was extremely favorable for a realization of the possibilities that this condition presented. Capital was plentiful and was venturing in new and unique fields of investment. The public mind had, in a measure, been focussed upon the possibilities of natural gas as a fuel supply during the war period. Through the activities of the conservation agencies, other forms of fuel, as coal and oil, that could be stored, transported and utilized, without limitation, were husbanded and the public was urged to avail itself of the use, wherever possible of natural gas, a fuel that had definite geographic limits of distribution.

Gains Recorded in Science of Transmission

Concurrent with the development of new and stable sources of supply and the quickened interest of the public, there came marked improvements in the technique of long distance gas transportation. The improvement in couplings and the perfection of the welding process as applied to construction of transmission lines made possible working pressures higher than those hitherto used, with a consequent increase in delivery capacity for lines of a given size. But more important still was the successful and economic manufacture of pipes of very large diameter. The effect of this factor upon the economies of long distance transportation will be readily understood, for the cost of constructing a natural gas pipe line increases directly as the diameter of the pipe increases. The capacity of the pipe to deliver gas increases, distance and pressures being equal, with the 2.67 power of the diameter increase. Thus cost of a 20-inch pipe line of a given length will be little more than double that of a 10-inch line of the same length while its capacity to deliver gas under similar working conditions will be more than five and one-half times as great.

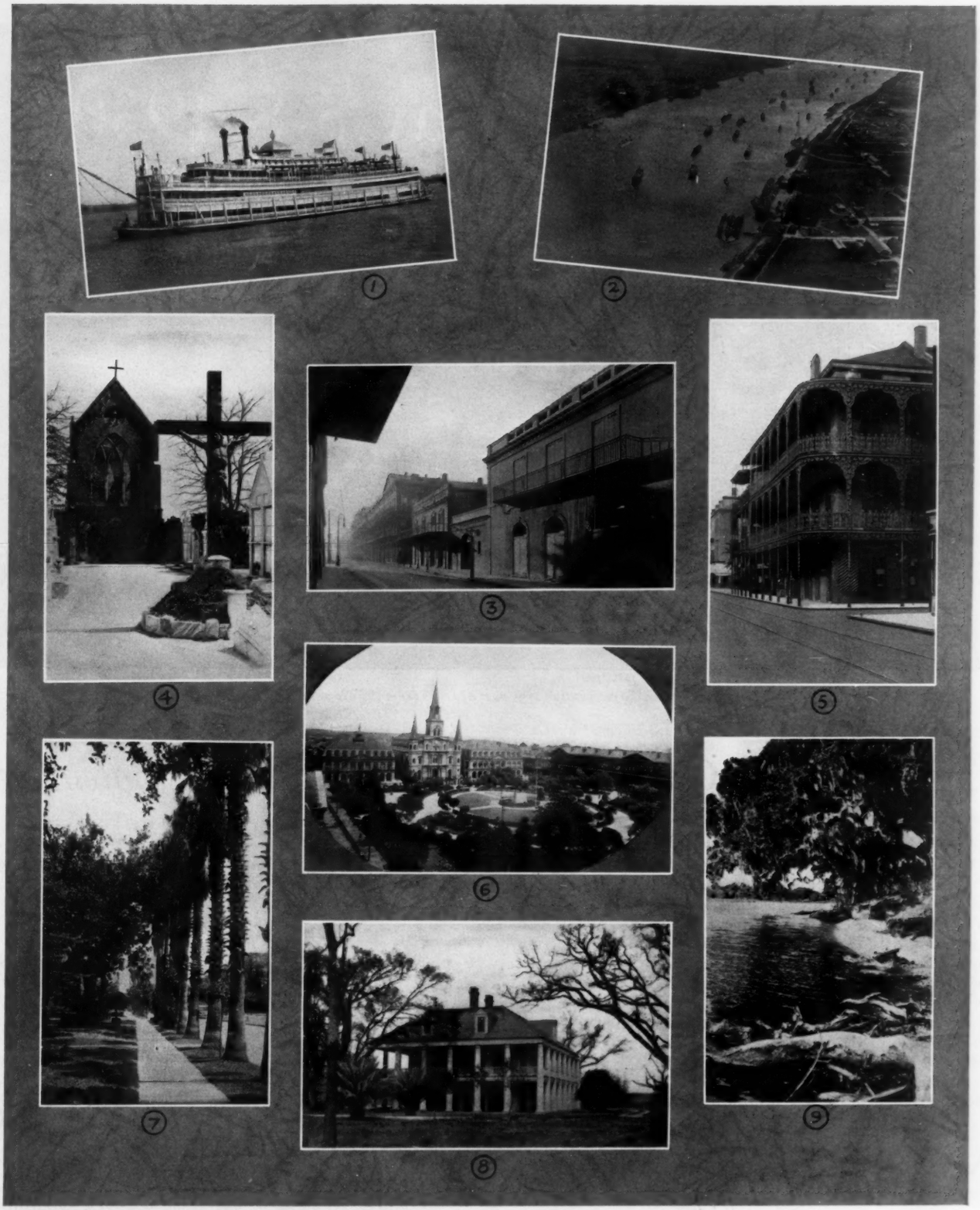
Out of this combination of favorable circumstances, the present era of natural gas development really began. The established companies entered into an extensive as well as an intensive development of their distribution territories. As an illustration of this expansion, in 1918 the Lone Star Gas Company, one of the pioneer companies of the Southwest, operated a system consisting of 1800 miles of pipe of equivalent 3-inch diameter. In 1929 the system of this same company had increased until it consisted of over 12,800 miles of pipe of equivalent 3-inch diameter, and its attached customers had increased from 63,000 to 228,000 during the same period. This example is typical of what has happened in Oklahoma, Kansas, Arkansas and Louisiana in reference to the other pioneer companies serving these particular territories.

This intensive development of the territory served by the pioneer companies, remarkable as it has been, is neither as interesting nor as significant as is another and more recent phase which has consisted of the extension of natural gas service, in some cases over distances formerly considered uneconomic, to large and altogether new distribution centers. San Francisco is now served with natural gas from the Kettleman fields; Salt Lake City and Ogden from the fields of Casper, Wyoming; Denver and Kansas City from the Texas Panhandle; St. Louis, Memphis and New Orleans from the Richland and Monroe fields of Louisiana, as are also all of the more important cities of Mississippi, Alabama and Georgia as far east as Macon. Recently, in El Paso, Texas, natural gas was turned into the mains of a distribution system that had previously handled manufactured gas. This was an event of peculiar significance in that it marked the last stand of manufactured gas in the vast State of Texas. There are persistent rumors now afloat that other important centers, more remote from the sources of supply than any now being served, will soon be connected with the producing areas. The extent to which the probabilities will be realized remains to be seen. Despite the development and consolidation of large reserves, the eagerness with which the public is seeking investments in natural gas projects, and the marked improvements in the technique of long distance transportation, there are many factors that definitely limit the distances over which natural gas may be economically transported.

Industry Achieves a National Status

However, the development that has taken place within the past five years, together with the proposed projects that are clearly within the economic limits of successful operation, has definitely removed the natural gas industry from the sphere of local importance and given to it a position almost national in its

(Continued on Page 120)



Views from the Convention City and Its Environs

1. The steamer "Capitol," on which delegates will embark for harbor excursion, May 5. 2. The Anchorage—a section of New Orleans' deep water frontage. 3. Le Petit Theatre du Vieux Carre, where ladies of the convention will be entertained. 4. Shrine of St. Roch, in the "Old Quarter." 4. Distinctive architecture of New Orleans' past, with its wrought iron work, may still be seen. 6. Place d'Armes, the heart of the Vieux Carre, where the best of the New Orleans of a century ago is preserved intact. 7. The city's residential sections are unsurpassed. 8. Mansions like this one conjure up visions of the Old South. 9. Silent waters of Louisiana bayous are in the scenic background of the convention.

Historic New Orleans, the convention city, as it appears from the air above the waterfront.

The Natural Gas Department Convention Calendar

FROM May 5 to 8, New Orleans, "America's most interesting city," is the mecca which draws natural gas men from every corner of the country to hospitable Louisiana. For its annual meeting, known this year as "The Western Natural Gas Convention," the American Gas Association Natural Gas Department has set up a program combining the technical phases of the industry with entertainment features to which the convention locale lends itself in an unusual way. Headed by A. B. Paterson, vice-president of New Orleans Public Service, Inc., the convention committees have discharged their advance duties and await the influx of natural gas men.

Here are the convention items of business, general session, and entertainment, arranged in the order of their occurrence:

MONDAY . . . . MAY 5

10:30 A.M.

Meeting of the Main Technical and Research Committee and subcommittees, Room C, Mezzanine Floor, The Roosevelt.

2:30 P.M.

Boat Ride on the Deluxe Steamer, Capitol, leaving the wharf at the foot of Canal Street.

5:30 P.M.

Meeting of the Managing and Advisory Committee, Natural Gas Department, Room G, Mezzanine Floor, The Roosevelt.

6:30 P.M.

Annual Dinner, Managing and Advisory Committees, Natural Gas Department, Room C, Mezzanine Floor, The Roosevelt.

9:00 P.M.

Grand Ball, Tip Top Inn, The Roosevelt.

TUESDAY . . . . MAY 6

9:30 A.M. **Tip Top Inn**

GENERAL SESSION

Opening Remarks by the Chairman—H. C. Morris, Chairman, Natural Gas Department.

Invocation—Rev. Father P. M. H. Wynhoven, Gretna, Louisiana.

Address of Welcome—Hon. T. Semmes Walmsley, Mayor of New Orleans.

Address of the Chairman—H. C. Morris, Dallas Gas Company, Dallas, Texas.

Appointment Committee on Chairman's Address—H. C. Cooper, Vice-Chairman, Natural Gas Department.

Secretary's Report—E. J. Stephany, Dallas, Texas.

Natural Gas, America's Newest Giant—B. J. Mullaney, President, American Gas Association.

Address—Alexander Forward, Managing Director, American Gas Association.

Promoting Natural Gas Sales—F. M. Rosenkrans, Gas Service Company, Kansas City, Missouri.

Wrinkles—H. J. Hoover, Cincinnati, Ohio.

Collecting Natural Gas Statistics—R. W. Gallagher, East Ohio Gas Company, Cleveland, Ohio.

10:00 A.M.

The Ladies' Old French Quarter tour, starting from the Mezzanine Floor of The Roosevelt. This tour will be followed by a Luncheon.

1:30 P.M. **Tip Top Inn**

GENERAL SESSION

Natural Gas Fellowships—J. B. Tonkin, Peoples Natural Gas Company, Pittsburgh, Pennsylvania.

Natural Gas Developments on the Pacific Coast—W. S. Yard, Pacific Gas and Electric Company, San Francisco, California.

Our Main Technical and Research Committee—H. C. Cooper, Hope Natural Gas Company, Pittsburgh, Pennsylvania.

Gas Measurement—T. R. Weymouth, Oklahoma Natural Gas Corporation, Tulsa, Oklahoma.

Pipe Line Flow—H. D. Hancock, Henry L. Doherty and Company, New York City, New York.

Gas Well Delivery Capacities—N. C. McGowen, Louisiana Gas and Fuel Company, Shreveport, Louisiana.

Leak Detection and Prevention in Congested Cities—Dr. J. B. Garner, Peoples Natural Gas Company, Pittsburgh, Pennsylvania.

WEDNESDAY . . MAY 7

9:30 A.M. **Tip Top Inn**

GENERAL SESSION

Pipe Protection—George Wehrle, Public Service Company of Colorado, Denver, Colorado.

Building Domestic Load by Selling Appliances—W. J. MacIntyre, Southern Cities Distributing Company, Shreveport, Louisiana.

Conservation in Louisiana—Dr. J. A. Shaw, Department of Conservation, Shreveport, Louisiana.

Home Service—Miss A. Berry, San Antonio Public Service Company, San Antonio, Texas.

Activities of a Pubic Relations and Advertising Department—R. E. Haas, Columbia Gas and Electric Corporation, New York, New York.

1:30 P.M. **Tip Top Inn**

GENERAL SESSION

Open Forum, presided over by J. D. Creveling of Henry L. Doherty and Company. The following subjects, and others, will be open for general discussion:

1. Handling Water in Wells,

   Discussion Leader—J. H. Dunn, Lone Star Gas Company, Dallas, Texas.

2. Recent Progress in the Saturation of Natural Gas with Oil and/or Water,

   Discussion Leader—H. L. Gaidry, New Orleans Public Service, Inc., New Orleans, Louisiana.

3. The Relative Advantages of Displacement and Orifice Meters,

   Discussion Leader—George B. Sheppard, United Gas Company, Houston, Texas.

4. How to Build up Load in Southern Climates with a Large Percentage of Colored or Foreign Population,

   Discussion Leader—L. E. Vogelsang, San Antonio Public Service Company, San Antonio, Texas.

5. Selling Gas for Househeating with Straight Gas and Conversion Units,

   Discussion Leader—J. J. Brennan, Memphis Power and Light Company, Memphis, Tennessee.

8:30 P. M.

The Stag Smoker, "Mardi Gras in May," will be held in Tip Top Inn, The Roosevelt.

8:00 P.M.

The Ladies will be entertained at Le Petit Theatre du Vieux Carre, 616 St. Peter Street.

THURSDAY . . . MAY 8

9:30 A.M. **Tip Top Inn**

A Uniform Classification of Accounts—E. N. Watkins, Arkansas Natural Gas Corporation, Shreveport, Louisiana.

Application of Degree Day Deficiency to Computing Domestic and Heating Loads—R. M. Redding, Dallas Gas Company, Dallas, Texas.

Gas Field Studies—E. L. Rawlins, U. S. Bureau of Mines, Bartlesville, Oklahoma.

Development of Larger Industrial Sales—W. M. Little, Cities Service Gas Company, Bartlesville, Oklahoma.

Report of Committee on Chairman's Address.
Report of Committee on Final Resolutions.

Seen *on the* 1930 Natural Gas

Reporting a Survey of Current Western Pipe

FOR several years past *Western Gas'* Annual Natural Gas Edition has contained a running review of pipe line construction and features outstanding in the expansion programs of western companies. Added value is imparted to this year's review by a tabulation of almost 200 individual pipe line projects completed in 1929, under construction or proposed for future completion. Area covered includes western United States and Canada.

The informative article contributed by Mr. Espy in conjunction with this tabular survey gives details on many of the more significant undertakings carried through last year or planned for the near future.

Here are some of the totals for gas line construction in western America, as summarized from the tabulations:

Laid in 1929	Laid to Date or Under Construction, 1930	Definitely Projected
5,756.61 Miles	1,263.25 Miles	4,064.48 Miles

Information condensed in these tables has been gathered by *Western Gas* over a period of several months, and its presentation is made possible through the cooperation of many gas companies. A comprehensive picture of the West—the center of intense natural gas activity—is the result.

As an important current contribution to that picture, attention is also directed to the regional maps of gas transmission lines which appear in this section. One map shows California transmission systems, another the natural gas lines of the Mountain area, and a third those of the Mid-Continent–Mid-West section. Gas lines charted in these maps have been taken from individual company maps furnished to *Western Gas* for the purpose.—*Editor.*

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
ARKANSAS					
Arkansas Natural Gas Corp.	Emmett to Saratoga	27	10	Completed, 1929	.....
Arkansas Natural Gas Corp.	Saratoga to Nashville	13	4	Completed, 1929	.....
Arkansas Natural Gas Corp.	Camden to Fordyce	27	6	Completed, 1929	.....
Arkansas Natural Gas Corp.	El Dorado to Emmett	58	12	Completed, 1929	.....
Arkansas-Oklahoma Gas Co.	Lavaca to Fort Smith	12	10	Completed, 1929	$100,000
Arkansas-Oklahoma Gas Co.	Central City to Greenwood	8	4	Completed, 1930	30,000
Arkansas Western Gas Co.	Clarksville fields to Fayetteville and Bentonville	120	8, 5 and 4	Completed, 1930	.....
Arkansas Power & Light Co.	Memphis Natural Gas Co. line to McGhee, Dermott, Lake Village, Eudora, Wilmot	Laterals		Completed, 1929	.....
Arkansas Power & Light Co.	Mississippi River Fuel Co. line to Jonesboro, Searcy, Kensett, Hoxie, Walnut Ridge, Newport	Laterals		Completed, 1929	.....
CALIFORNIA					
Coast Counties Gas & Electric Co.	From the P. G. & E. line to to Watsonville	13.8	10	Completed, 1929	.....
Coast Counties Gas & Electric Co.	From main line to Gilroy	5.5	6	Completed, 1929	.....
Coast Counties Gas & Electric Co.	Gilroy to Morgan Hill	10.3	4	Completed, 1929	.....
Coast Counties Gas & Electric Co.	Main line to San Juan	2.6	4	Completed, 1929	.....
Coast Counties Gas & Electric Co.	P. G. & E. Line to Hollister	2.3	6, 4 and 3	Completed, 1929	.....
Coast Counties Gas & Electric Co.	Concord to Walnut Creek	6	..	Completed, 1929	.....

By CRAIG ESPY

TIME and markets seem to be the only limiting factors to natural gas transmission line development, which has progressed with unabated speed during the past year and will accelerate in the balance of 1930.

From the Mid-Continent area westward the industry is humming with the natural gas pipe line program, and every other phase of the industry quickens its step correspondingly. At this time last year the gas trunk line to St. Louis from Louisiana fields was building, and contracts had been let on the line bringing Louisiana gas to Atlanta. On the west coast the first line to the San Francisco Bay area was in an advanced stage, as was also the Wyoming-Utah natural gas system, and the line to El Paso from New Mexico sources. Now these and other important projects, finished and in service, are accepted as a matter of course, and the center of interest shifts —to the 990-mile Panhandle-Nebraska line for which ground was broken a few days ago; to the imposing Chicago project—two lines which seem assured from the same fields; the Montana-to-Bismarck carrier, now being launched; the second line to northern California, now pushing to completion; to New Mexico's first major line, bringing natural gas for Albuquerque. And on the borderline between rumor and possibility the industry turns its ear to suggestions of natural gas for Arizona cities and mining industries; for the Anaconda and Butte, Montana, industrial load; for Minneapolis . . . and the list could go on.

In the following paragraph the writer will pass in review a number of the important 1929 enterprises, and will draw together the available details on current and proposed undertakings. There will be little space for discussing projects of the "rumored" status, for the list of lines going actively forward or determined upon for early launching grows longer each month.

Many of the references which are made to line projects may be seen graphically on the maps which are a part of this issue.

Horizon

Line Enterprises

Mid-Continent Manager,
WESTERN GAS.

Outwardly changing the entire set up for piping Texas Panhandle gas to larger centers in Nebraska and Iowa came the announcement in April that the Lone Star Gas Corporation, in association with the United Light and Power Company and the North American Light & Power Company, would begin immediate construction of a 990-mile gas line to points in these states.

Actual construction on this major line began late in April, going north from a point near Clifton, Kansas. Smith Brothers, Inc., Dallas contracting firm has a 300-mile construction contract in the project.

The line will originate in Moore county in the Amarillo field and will probably extend in a direct line to a point in northern Kansas, and from there to a point northeast of Lincoln in the proximity of Omaha. Here the line branches, one extension going east and north to Des Moines, continuing in a northerly direction to Webster City and to Mason City, the terminus. The other branch goes north from a point near Omaha to Sioux City.

Lincoln, and Beatrice, Nebraska; Red Oak, Shenandoah, Fort Dodge Sioux City, Clear Lake, Mason City, Des Moines and Council Bluffs, Iowa, are among the 50 towns which the carrier will serve.

In its route northward, the line will also tap Stevens County, Kansas, gas fields, located near Hugoton. This area was to have been the source for the gas line originally launched to Omaha by the Moody-Seagraves interests.

The three interests involved in the new project have bought the holdings of the Moody-Seagraves group in the Stevens county, Kansas, gas field, including the Argus Gas Company with its recently constructed 150-mile system from this field serving 15 towns in southwestern Kansas.

The Moody-Seagraves interests controlled 350,000 acres of gas land in the Stevens County field, with an estimated reserve of 6½ trillion cubic feet.

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
Coast Counties Gas & Electric Co.	Walnut Creek to Danville	7	..	Completed, 1929	.....
Coast Counties Gas & Electric Co.	Pittsburg to Bay Point	4.5	..	Completed, 1929	.....
Coast Counties Gas & Electric Co.				Total Cost above lines	$600,000
Coast Counties Gas & Electric Co.	From Standard Pacific Line to Los Banos	8	4	Proposed	40,000
Coast Counties Gas & Electric Co.	From Standard Pacific Line to Gustine	7	4	Proposed	35,000
Coast Counties Gas & Electric Co.	From Standard Pacific Line to Dos Palos	10	4	Proposed	50,000
Coast Counties Gas & Electric Co.	From Standard Pacific Line to Byron Pump Station	6	6	Proposed	40,000
Coast Counties Gas & Electric Co.	From Standard Pacific line to Merced	35	8	Proposed	300,000
Coast Counties Gas & Electric Co.	From Standard Pacific line to Miller's Canal near Gilroy	33	8	Proposed	350,000
Coast Counties Gas & Electric Co.	Approximately 100 miles of pipe to be laid to oil pumping stations in the San Joaquin Valley and Contra Costa County	100	4 equiv.	Proposed	500,000
Pacific Gas & Electric Co.	Buttonwillow to San Francisco	51.5 153.3 39.8	16 20 22	Completed, 1929	7,200,000
Pacific Gas & Electric Co.	Milpitas to Richmond	52.3	20	Completed, 1929	1,800,000
Pacific Gas & Electric Co.	Hollister to Monterey	19.8 23.6	8 12	Completed, 1929	600,000
Pacific Gas & Electric Co.	Tracy Junction to Milpitas	37	22	In progress	800,000
Pacific Gas & Electric Co.	Vernalis Junction to Sacramento	2.0 80	12 16	In progress	1,800,000
Pacific Gas & Electric Co.	Ripon to Modesto	18	8	Proposed	.....
Pacific Gas & Electric Co.	Salida to Riverbank	5.0	4	Proposed	.....
Pacific Gas & Electric Co.	Davis to Dixon	8.0	6	In progress	133,000
Pacific Gas & Electric Co.	Carquinez Bridge to Petaluma	35 3.1	12 16	Proposed	.....
Pacific Gas & Electric Co.	Cotati to Healdsburg	16 7	6 8	In progress	242,000
Pacific Gas & Electric Co.	Napa to Calistoga	7 23.7 3	4 6 8	In progress	358,000
Pacific Gas & Electric Co.	Shellville to Sonoma State Home	4.8 7	4 6	Proposed	.....
Standard Pacific Gas Line, Inc.	Kettleman Hills to Richmond	3.2 10 42 24.7 120.4	12 20 22 24 26	In progress	17,000,000 (Estimated)
Santa Maria Gas Co.	Gaviota to Orcutt	37	8	Completed, 1929	.....
Santa Maria Gas Co.	Betteravia to Guadalupe	5	6	Completed, 1929	21,557
Santa Maria Gas Co.	San Luis Obispo to Paso Robles	30	6	Completed, 1929	.....
Santa Maria Gas Co.	Orcutt to Santa Maria	6	6	Completed, 1929	29,654
Southern California Gas Co.	Kettleman Hills to Fresno	57.5	10 and 8	Completed, 1929	.....
Southern California Gas Co.	Lemoore Junction to Visalia	30.5	6	Completed, 1929	.....
Southern California Gas Co.	Selma Junction to Selma	14	4	Completed, 1929	.....
Southern California Gas Co.	Kettleman Hills to Buena Vista Hills	70	20	Completed, 1930	.....
Southern California Gas Co.	Wineville to Colton	14	10	Completed, 1929	.....
Southern California Gas Co.	Banning to Palm Springs	23	4	Completed, 1930	.....
Southern California Gas Co.	Corcoran Junction to Corcoran	16.5	4	In progress	.....
Southern California Gas Co.	Rio Bravo to Delano	43	6 and 4	In progress	.....
Southern California Gas Co.	Alberhill to Elsinore	6.5	4	Completed, 1929	.....
Southern Counties Gas Co.	Laguna to San Diego County Boundary	11.9 .6	12¾ 6	Completed, 1929	159,824

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
CANADA					
Northwestern Utilities, Limited	Viking, Alberta to Holden, Alberta	20.66	12¾	Completed, 1929	$296,000
Northwestern Utilities, Limited	Holden to Ryley	9	12¾	Proposed	130,000
Canadian Western Natural Gas, Light, Heat & Power Co.	Main line to Taber	....	..	Completed, 1929	.....
COLORADO					
Mesa Grande Gas Co.	Ute Dome, N. Mex. to Durango, Colo.	33.5	6	Completed, 1929	.....
Colorado-Wyoming Gas Co.	Main line to Boulder	7	6 and 8	Completed, 1930	.....
Colorado-Wyoming Gas Co.	Fort Collins to Littleton	65	8 and 10	Completed, 1929	.....
Colorado-Wyoming Gas Co.	Main line to Johnston	11	6	Completed, 1929	.....
Colorado-Wyoming Gas Co.	Johnston lateral to Greely	12	6	Proposed	.....
Colorado-Wyoming Gas Co.	Main line to Golden	7	4	Proposed	.....
IOWA					
Peoples Gas & Electric Co.	Mason City to Clear Lake	10	4	Completed, 1930	45,000
Iowa Ry. & Light Corp.	Ames to Nevada	8.4	4	Completed, 1929	35,633
KANSAS					
Argus Gas & Fuel Co.	Stevens County to Elkhart	31.4	4	Completed, 1929	.....
Argus Gas & Fuel Co.	Stevens County to Dodge City	87.19	8	Completed, 1929	.....
Argus Gas & Fuel Co.	From 8 inch main line to Meade	22.17	4	Completed, 1929	.....
Argus Gas & Fuel Co.	From 8 inch main line to Cimarron	11.88	4	Completed, 1929	.....
Argus Gas & Fuel Co.	From 4 inch Meade line, lateral to Plains	13.35	3	Completed, 1929	.....
Argus Gas & Fuel Co.	From 4 inch Meade line to Fowler	9.31	3	Completed, 1929	.....
Argus Gas & Fuel Co.	From 4 inch Meade line to silica mine	2.29	2	Completed, 1929	.....
Cities Service Gas Co.	Petrolia Station to Fort Scott	42.5	8	Completed, 1929	$465,648
Cities Service Gas Co.	Ottawa Compressor Station to Lawrence	19	20	Completed, 1929	395,350
Cities Service Gas Co.	Lawrence to Topeka	12	16	Completed, 1929	247,354
Cities Service Gas Co.	Saginaw Station to Springfield	73 9 11	10 4 3	Completed, 1929	1,191,142
Cities Service Gas Co.	Atchison to Hiawatha and Sabetha, Kans., and to Falls City, Nebraska	16.5 11.5 40	4 6 8	Completed, 1929	528,578
Cities Service Gas Co.	Hutchinson to Lyons	29	8	Completed, 1929	236,473
Cities Service Gas Co.	Lyons, Kan. to Superior, Neb.	116 49 37 46	8 4 3 2	In progress	1,557,529
Cities Service Gas Co.	Wichita to Greenwich pool	8	4	Completed, 1929	26,770
Cities Service Gas Co. and affiliated interests	Double line from Amarillo field, Texas, to Chicago	950 (Approx.) Each	22, 24	Proposed	100,000,000
Chase County Pipe Line Co.	Six miles north of Strong City to Strong City	6	4	Completed, 1929	7,000
Chase County Pipe Line Co.	.....	28	5 and 4	Proposed	.....
Kansas Pipe Line & Gas Co.	Main line to Concordia	17.8	8	Completed 1929	.....
Kansas Pipe Line & Gas Co.	Main line to Belleville	7.25	6	Completed, 1929	.....
Kansas Pipe Line & Gas Co.	Miscellaneous	11.35 1.5	2 4	Completed, 1929 Completed, 1929	....
Kansas Pipe Line & Gas Co.	Abilene to Giltner	141.92	16	Completed 1929	.....
Kansas Pipe Line & Gas Co.	McPherson to Voshell Pd.	7.82	8	Completed, 1929	.....
Kansas Pipe Line & Gas Co.	Lewis to Nashville	53.2	8	Completed, 1929	.....
Kansas Pipe Line & Gas Co.	Halstead to Hutchinson	22.58	8	Proposed	.....
Kansas Pipe Line & Gas Co.	Miscellaneous	2.25 4.99 5.28	3 4 8	.....	.....

A holding company is now forming, which will control four subsidiaries to operate the Nebraska-Iowa project. The pipe line itself will be operated under the name of the Missouri Valley Gas Company.

The United Light and Power Company and the North American Light and Power Company also have franchises to serve manufactured gas in many of the principal cities in Nebraska and Iowa. Lone Star holds a franchise for manufactured service in Council Bluffs, Iowa. This combination establishes the market basis for the new transmission line, one of the longest yet to be announced.

The North American Light & Power Company is also the holding Company for the Kansas Pipe Line & Gas Company which in turn owns Western Gas Company, both operating extensively in Kansas.

Kansas Pipe Line & Gas Company last year constructed approximately 350 miles of gas system in Kansas, the largest unit of which was a 158-mile 16-inch extension from Abilene, Kansas, to Grand Island, Nebraska, serving many Kansas towns en route.

The two interests associated with the Lone Star are also understood to be identified with the Nebraska Pipe Line Company and the Nebraska Natural Gas Company, affiliated organizations recently formed to pipe and distribute gas in Nebraska.

The 990-mile line will be of 24, 22, and 20-inch pipe, a large portion of which has already been shipped, being that originally contracted for by the Missouri Valley Gas Company for the Omaha project announced recently.

Officials of the Lone Star state that all of the engineering work and a considerable portion of the actual construction of the line will be done by the engineering and construction departments of the Lone Star Gas Company, with headquarters in Dallas.

The capacity of the line will be in excess of 200,000,000 cubic feet of gas per day. Three compressor stations of 15,000 H. P. each are to be a part of the construction program.

CHICAGO MARKET ON HORIZON

Another outstanding project is the proposed line to Chicago. This line seems to be assured with actual construction probably to begin at an early date.

The tremendous natural gas system projected to the Chicago area will also originate in Texas Panhandle and will probably supply gas to northern Illinois and northwestern Indiana, in addition to supplying gas for distribution at Chicago.

Entry of Insull Son & Company of Chicago, into negotiations with Cities Service, The Texas Corporation, Phillips Petroleum Company, Skelly Oil Company, Columbian Carbon Company and Standard Oil Company of New Jersey, which control large gas areas in the Panhandle, brings apparent assurance that the line construction will be launched shortly.

The latter group of interests has formed a company for construction of the line, which is likely to be under the charge of the Cities Service Company. Insull Son & Company will control distribution in Chicago, probably mixing the natural gas with manufactured.

The line itself will be approximately 950 miles in length, and of 22- or 24-inch pipe. Last reported plans indicate that the line will be a double one—two lines of the same size laid over the same right of way. Construction of the first line is understood to be planned for completion during 1930. The project will cost approximately $100,000,000.

MAJOR WEST COAST PROGRAM

With the introduction of natural gas into population centers of northern California, as a result of the transmission line undertakings completed or in progress by the Pacific Gas and Electric Company, and the Satndard-Pacific Gas Line, Inc., a new complexion has been given the entire west coast industry. In addition to the two large gas carriers, which form the backbone of the above companies' natural gas programs, a number of other significant line extensions have been made in California, notably the Southern California Gas Company's line from Kettleman Hills to Buena Vista Hills; the same company's line from Kettleman Hills to Fresno; the Southern Counties Gas Company extension from Santa Barbara to Gaviota and the Santa Maria Gas Company's line north from Gaviota to Paso Robles. These projects, with others of somewhat lesser importance, make the 1929-1930 activity in California notable in the programs of recent years.

Pacific Gas and Electric Company early in 1929 began construction of a 250-mile line from Buttonwillow and Kettleman Hills gas fields to serve San Francisco, Oakland, Richmond, San Jose, and other cities and towns of northern California. This line was brought to completion during early fall, and the change-over from manufactured to mixed natural gas was made at various points on the line, San Francisco being cut over on November 1. The line travels a straight course to Milpitas, where it branches, one division going to San Francisco and other pen-

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
Public Service Co. of Kansas	Clark County to Pratt, Ashland, Protection, Coldwater, Haviland, Cullison	35.15 23.70 10 14.85	8 6 3 2	Completed, 1929	563,500
United Gas & Pipe Line Co.	Hays to Bison	30	6	Completed, 1929	.....
Carlton Pipe Line Co.	Medicine Lodge to Sec. 12-Twp. 33S-Rge. 13W, Barber County	10	4½	Completed, 1929	30,000
Carlton Pipe Line Co.	Sec. 12-Twp. 33S-Rge. 13W to Woodward, Oklahoma	78.5	6	Completed, 1929	340,000
Sunflower Gas Co.	From St. Paul fields to Parsons	....	..	Completed, 1929	.....
Veeder Supply & Devel. Co.	.....	17	6, 4 and 2	Completed, 1929	.....
LOUISIANA					
Arkansas Natural Gas Corp.	Monroe and Richland Fields to Longwood	137	20	Completed, 1929	.....
Arkansas Natural Gas Corp.	Lewis, Louisiana, to Winnsboro and Mt. Vernon Texas	129	6 8 4	Completed, 1929	.....
United Carbon Co.	Ouachita Parish to Union Parish	....	..	Completed, 1929	.....
Mississippi River Fuel Corp.	Monroe fields to St. Louis (industrial)	431	22	Completed, 1929	.....
Southern Natural Gas Corp.	From Monroe fields to Atlanta and other cities in Georgia Mississippi, and Alabama	909	22	Completed, 1929	25,000,000
MISSOURI					
Missouri-Kansas Pipe Line Co.	Bannister Ridge to Kansas City	....	..	Completed, 1929	.....
Missouri-Kansas Pipe Line Co.	Kansas City shale fields to Independence, Sugar Creek and Fairmont	10	..	Completed, 1929	.....
Missouri Natural Gas Co.	Mississippi River Fuel Corp. line to Popular Bluff	10 (Approx.)	..	Completed, 1929	.....
MONTANA					
Big Horn Oil & Gas Development Co.	From the field to Hardin, Mont.	8.20	4, 3 and 2	Completed, 1929	35,329
Gallatin Natural Gas Co.	From Dry Creek Dome to Billings, emergency line	10	..	Completed, 1929	.....
Pondera Utilities Co.	From Kevin field to Conrad, Choteau and Valier	60 (Approx.)	..	Completed, 1929	.....
NEW MEXICO					
El Paso Natural Gas Co.	Jal, New Mexico to El Paso, Texas	209.46	16	Completed, 1929	.....
Pecos Valley Gas Co.	From gas field East of Artesia to Roswell, Artesia and Carlsbad	40	8⅝	Completed, 1929	.....
Southern Union Gas Co.	From San Juan Basin near Farmington to Albuquerque and Santa Fe	200	12 and 14	Proposed	.....
Southern Union Gas Co.	San Juan Basin to Farmington	....	..	Completed, 1929	.....
Gas Co. of New Mexico	South Plains Pipe Line Co. line at Hereford, Texas to Clovis, New Mexico	52	8	Completed, 1929	.....
Gas Co. of New Mexico	Clovis to Tucumcari	65	6	Proposed	.....
Gas Co. of New Mexico	Clovis to Portales	18	6	Completed, 1929	.....
NEBRASKA					
Iowa-Nebraska Light & Power Co.	Aurora to York	21	6	In progress	.....
Iowa-Nebraska Light & Power Co.	Fairmont to Exeter	6.5	3½	In progress	.....
Kansas Pipe Line & Gas Co.	Giltner to Grand Island	17.35	12	Completed, 1929	.....
NORTH DAKOTA					
Minnesota Northern Power Co.	From Baker-Glendive field to Williston, N. D.	80 (Approx.)	..	Proposed	.....
Minnesota Northern Power Co.	From Baker-Glendive field to Bismark	175 (Approx.)	..	Proposed	.....
OKLAHOMA					
Carlton Pipe Line Co.	From 6 inch line to Alva, to Cherokee	20	4½	Completed, 1929	60,000
Industrial Gas Co. of Oklahoma	From South Oklahoma City field to Oklahoma City	1 17 1	6 10 4	Completed, 1929 Completed, 1930	....

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
Standard Gas Co.	From Oklanoma Natural Corp. line in Johnson County to Tishomingo and Madill	.5 12	6 4	Completed, 1929	60,000
Standard Gas Co.	Main line to Randolph Silica Products Co.	.75	3	In progress	3,000
Consolidated Gas Utilities Co.	Hominy, to gas fields near town	6.8	4½	Completed, 1929	21,879
Consolidated Gas Utilities Co.	Sec. 12, Twp. 12N, R-21W Roger Mills County to Hammon	7.2	2	Completed, 1929	13,676
Consolidated Gas Utilities Co.	Fletcher to Apache	12	3	Completed, 1929	22,619
Consolidated Gas Utilities Co.	Sec. 35-28N-3W to Sec. 17-29N-1E, Grant County	13	10	Completed, 1929	149,500
Pioneer Gas Utilities Co.	From South Oklahoma City fields to McCloud	40	5 and 2	In progress	.....
Cimarron Utilities	Tryone and Guymon to Hooker, Forgan, Beaver, Baker, Turpin	90	..	Completed, 1929	.....
Junior Gas Co.	From field north of city to Heavener	....	..	Completed, 1929	.....
Cities Service Gas Co.	Dilworth Sta. in Kay County to Marshall-Lovell area	64 14 4 13	20 12 8 6	Completed, 1930	1,967,429
Cities Service Gas Co.	Marshall-Lovell line to Oklahoma City field	39 10 3.5	20 24 12	In progress	1,516,036
Cities Service Gas Co.	Seminole area to Saskwa Pool	6	6	Completed, 1929	53,603
Kingfisher County Gas Co.	From Roxana field to Kingfisher Dover, Hennessey	30	5	Completed, 1929	.....
Oklahoma Natural Gas Corp.	From Quinton gas field to Muskogee	50 (Approx.)	16	Proposed	1,000,000
Oklahoma Natural Gas Corp.	From Keefton field to Muskogee	12	8	Completed, 1929	.....
Oklahoma Natural Gas Corp.	From Ardmore to Standard Co line	26	..	Completed, 1929	.....
Mays County Pipe Line Co	Gas field near Claremore to Pryor	10	..	Completed, 1929	.....
Harris & Haun	From field in northern Kay County to a point near Blackwell	20	..	Completed, 1929	.....
Van Ray Pipe Line Co.	From well near Wilson to point near Blackwell	10	..	Completed, 1929	.....
OREGON					
*Portland Gas & Coke Co.	Woodburn to Mt. Angel and Silverton	12	4	Proposed	85,000
*Portland Gas & Coke Co.	Salem to W. Salem, Independence, Monmouth, Corvallis, Albany, Lebanon	35 18	6 4	Proposed	345,000
*Portland Gas & Coke Co.	Salem to Rickreall and Dallas	9	4	Proposed	60,000
*Portland Gas & Coke Co.	Portland to Salem and intermediate points	45	10 and 8	Completed, 1929	690,000
*Manufactured Gas Transmission Lines.					
TEXAS					
Consumers Natural Gas & Power Co.	Lohn to Janellen field, near Brownwood	31	5½	Completed, 1929	.....
Consumers Natural Gas & Power Co.	Big Spring, to South Plains Pipe Line Company's line	32	8	Completed, 1930	.....
El Paso Natural Gas Co.	Clint to Fabens	8.1	4	Completed, 1929	.....
Houston Pipe Line Co.	Newgulf to Texas Gulf Sulphur Plant at Long Point	12.8 1.8	12¾ 6	Completed, 1929	.....
Houston Pipe Line Co.	Coleto Creek to Guadaloupe River (Loop Line)	8.6	12, 14, 16 and 18	Completed, 1929	.....
Houston Pipe Line Co.	Bruni field to Kohler field	10.2	6	Completed, 1929	.....
Houston Pipe Line Co.	Main line to Goliad	5.3	2	Completed, 1929	.....
Houston Pipe Line Co.	Gulf Hills to Matagorda	6.2	4 and 2	Completed, 1929	.....
Houston Pipe Line Co.	Main line to Driscoll field	5.5	4	Completed, 1929	.....
Houston Pipe Line Co.	Main line to San Diego, Texas	9.1	2	Completed, 1929	.....

(Continued on Page 98)

insula cities, the other to Oakland and Richmond and points en route. The San Francisco project called for an expenditure of $7,200,000, with an additional $1,800,000 being expended on the line from Milpitas to Richmond.

A line is now under construction by the Pacific Gas and Electric Company which will take natural gas from the Standard-Pacific Gas Line, Inc., line to Stockton, Sacramento, and small towns on the route of the carrier. It is proposed during 1930 to extend this line to serve Roseville, Marysville, Willows, and many other small towns. The 12- and 16-inch line from Richmond, extending across an arm of the bay to Vallejo, and continuing on up to Petaluma is also to be under construction shortly, with connections to the company's manufactured gas transmission lines at San Rafael, which is scheduled for natural gas by September 1.

Standard-Pacific Gas Line, Inc., was formed in February of this year, combining the interests of Standard Oil Company of California and Pacific Gas and Electric Company for the purpose of constructing and operating a second line from Kettleman Hills to Richmond and Tracy. This line is now under construction, with 200 miles, mostly of 26-inch pipe being laid at a cost which may be estimated at approximately $17,000,000.

Entrance of Standard Oil Company of California into the public utility field was effected in October, 1929, when Standard purchased a controlling interest in the Pacific Public Service Corp., and thus took over its subsidiary, Coast Counties Gas and Electric Company, which operates in several northern California communities. Since the change in ownership a number of steps have been taken to link the natural gas interests of the oil company into California markets, its joint ownership with P. G. and E. of Standard-Pacific Gas Line, Inc., of course being the highlight.

Southern California Gas Company during 1929-1930 contributed approximately 250 miles of transmission line to the growning State total, with 70 miles of 20-inch pipe laid from Kettleman Hills to Buena Vista Hills, completed in the early part of 1930, and with a 60-mile line from Kettleman Hills to Fresno. This latter line was constructed of 10-inch pipe, and a 6-inch line was extended over 30 miles to serve Visalia and other communities. Work has been commenced by Southern California Gas Company on a high-pressure transmission line to serve several towns in central California with natural gas from Elk Hills and Buena Vista Hills areas. Among towns to be served by

(Continued on Page 98)

Maps on this order too large to be
are filmed clockwise beginning in t
right and top to bottom as many fr
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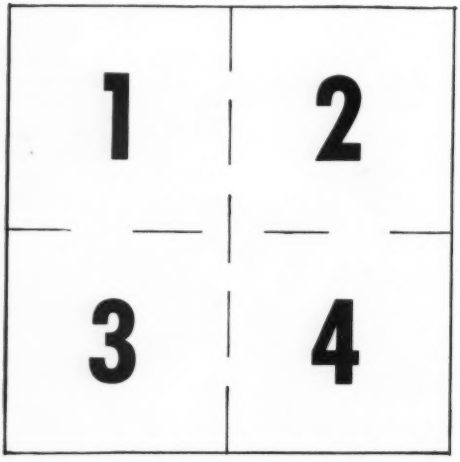

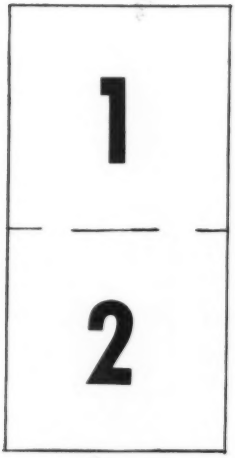

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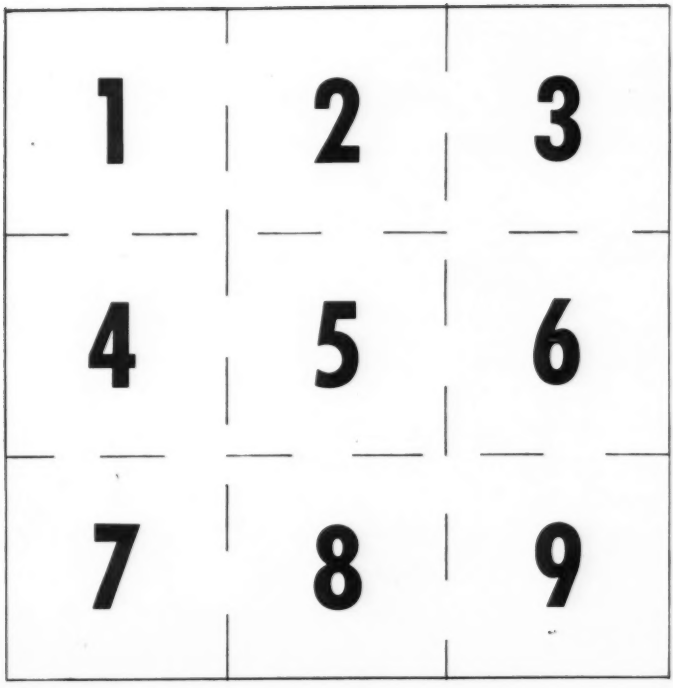
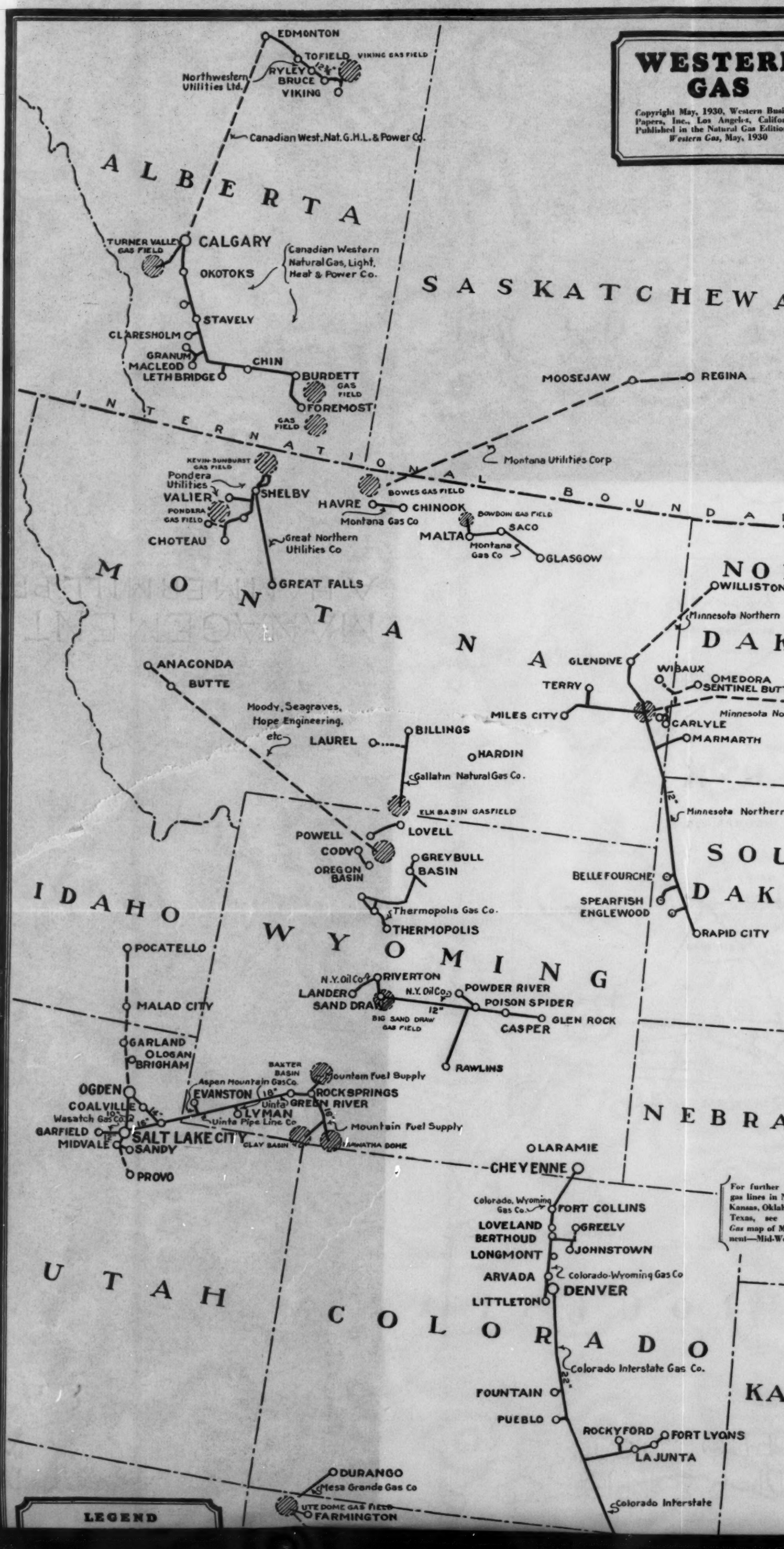


MOUNTAIN AREA

Natural Gas Transmission L



Lines

N E B R A S

K A N

O K L

T E X

GRAND I

HASTINGS

SUPERIOR

SMITH CENTER

CONCO

OSBORNE

LURAY

RUSSELL

LA CROSSE

Kan. Pipe Line & Gas

GREAT BEND

LARNED

HUTCHINSON

LYON

Cities Service

DODGE CITY

Argus Gas Co.

PRATT

Kansas Pipe Line & Gas

HAVILAND

STEPHENS COUNTY GAS FIELD

FOWLER

Public Service Co. of Kan.

HUGOTON

SATANTA

MEADE

ELKHART

ASHLAND

COLDWATER

MEDICINE LODGE

BARBER COUNTY GAS FIELD

HARDINER

GUYMON

TYRONE

HOOKER

FORGAN

BEAVER

Cimarron Utilities

TEXHOMA

Gas Co.

Public Service Corp. of Texas

SUPPLY

CAPRON

MEDFOR

CHEROKEE

FOLLETT

AVARD

Carlton Pipe Line Co.

PERRYTON

FARGO

WAYNOKA

Pub. Serv. Corp. of Texas

MOORELAND

SHATTUCK

QUINLAN

SPEARMAN

WOOD WARD

FAIRVIEW

Missouri Val.

Cities Service

HIGGINS STA.

OKEENE

Consol. Gas Utilities Co.

AMARILLO GAS FIELD

MIAMI

WATONGA

AMARILLO

PANHANDLE STA.

WEATHERFORD

ELK CITY

EL RENO

OKLAHO CITY

HEREFORD

CANVON

Union

Southern

List

SHAMROCK

TEXOLA

SAYRE

Northern

12"

Consol. Gas Utilities

TULIA

MANGUM

MOUNTAIN PARK

APACHE

ACME

Pipe

South Plains

TURKEY

HOLLIS

ALTUS

Consol. Gas

FORT SILL

QUANAH

FREDERICK

PLAINVIEW

LOCKNEY

FLOYDADA

Lone Star

Utilities

OKLA-UNION

BURKBURNETT

Stamford & Western Gas Co.

WICHITA FALLS

LEVELAND

LUBBOCK

CROSBYTON

TRUSCOTT

SEYMOUR

BROWNFIELD

POST

BRIEN

BRYSON

BRIDGE

STAMFORD

LA MESA

SNYDER

RUBY

ANSON

ALBANY

BRECKENRIDGE

GORDON

Consumers Nat. Gas & Power

SWEETWATER

COLORADO

BIGSPRING

STANTON

MIDLAND

ODESSA

DESDEMONA

CARBON

Southwest Gas Co.

WINTERS

DE LEON

CROSSPLAINS

COMANCHE

COLEMAN

Natural

Ohio

BALLINGER

BROWNWOOD

HAMILTON

SAN ANGELO

GOLDTHWAITE

LOMETA

BRADY

S. W. Utility Co.

SANSABA

LAMPASAS

ROUND ROCK

NEW BRAUNFELS

Houston Gulf

DEL RIO

Texas Gas Utilities Co.

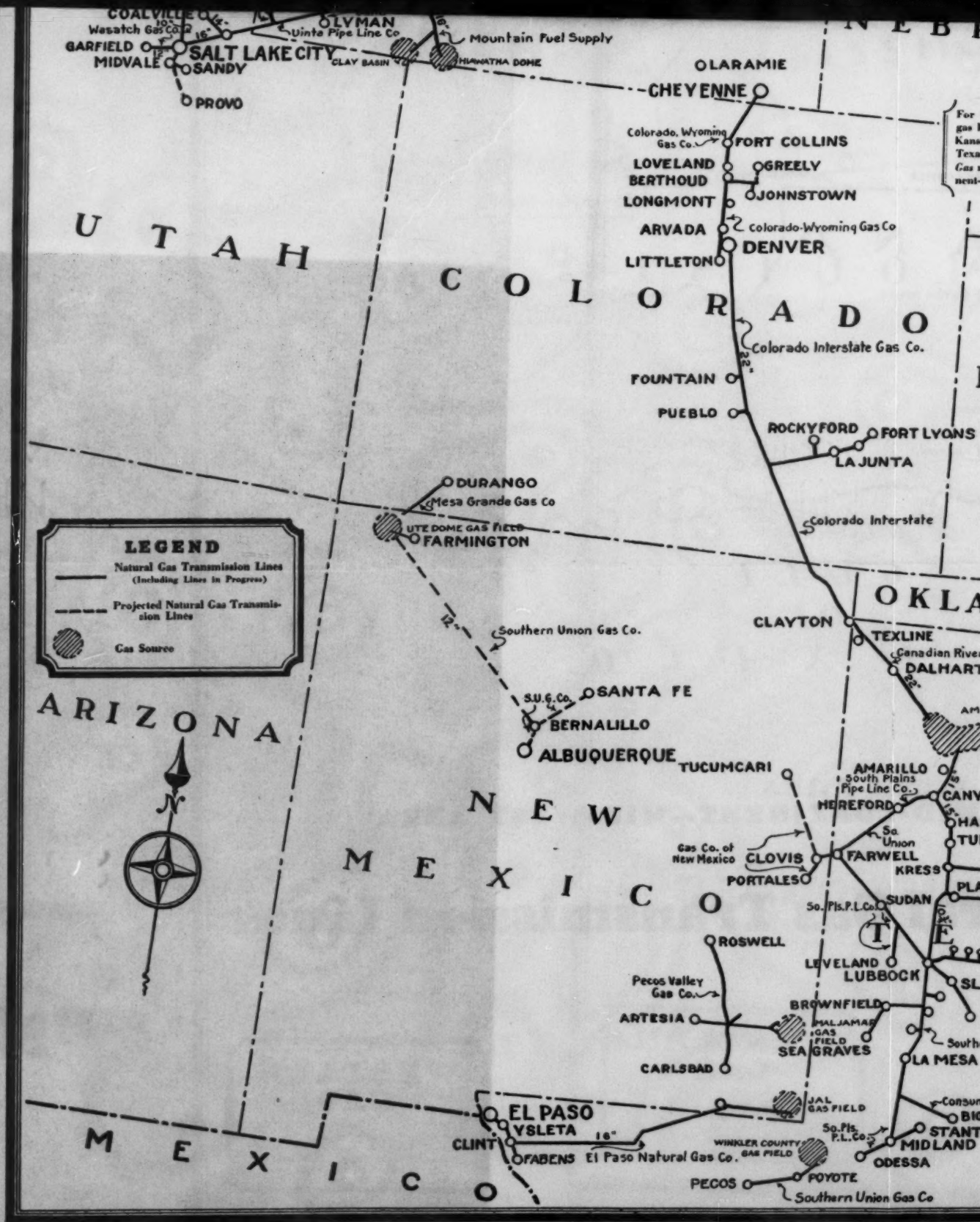
SAN ANTONIO

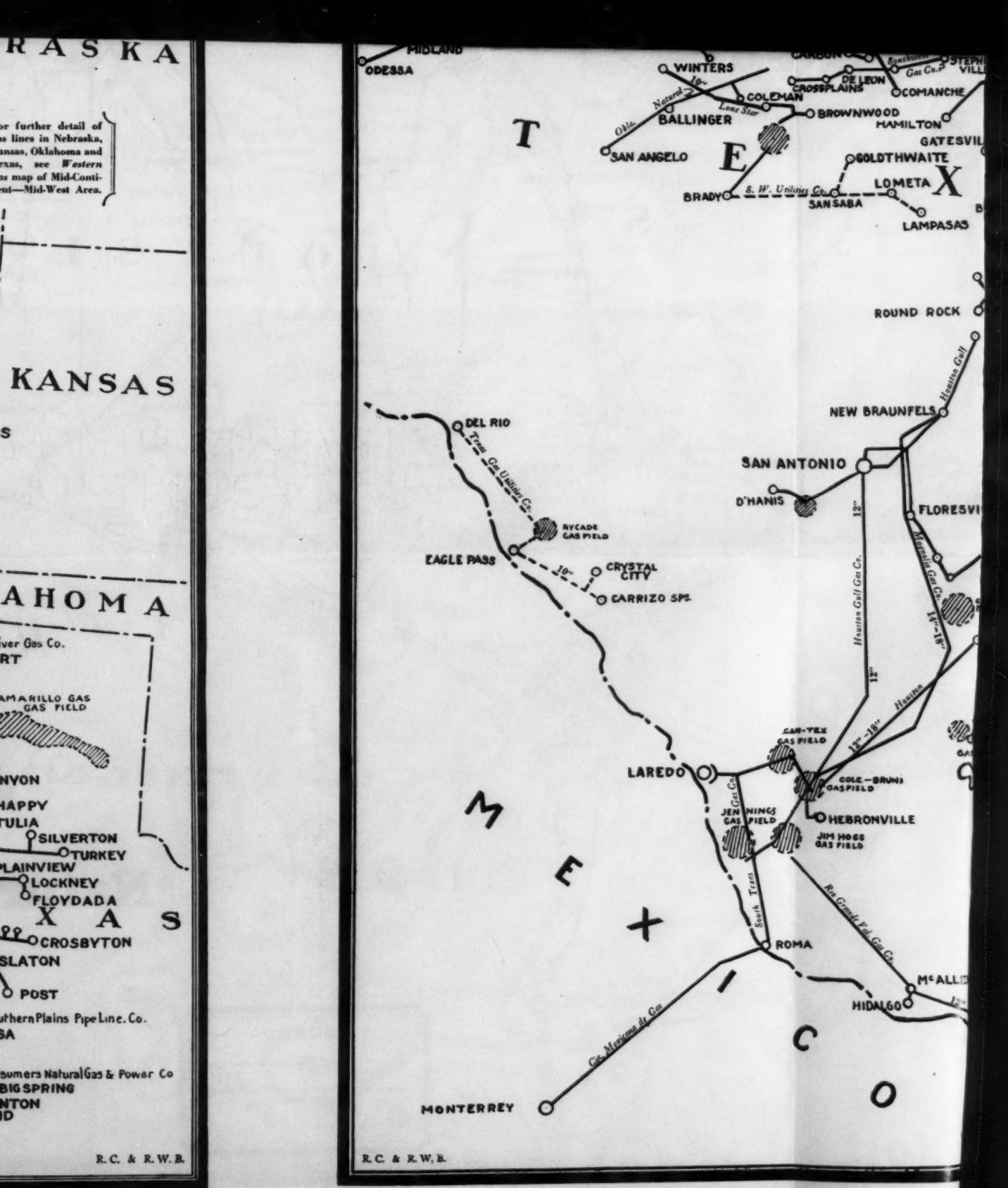
D'HANIS

FLORESVI

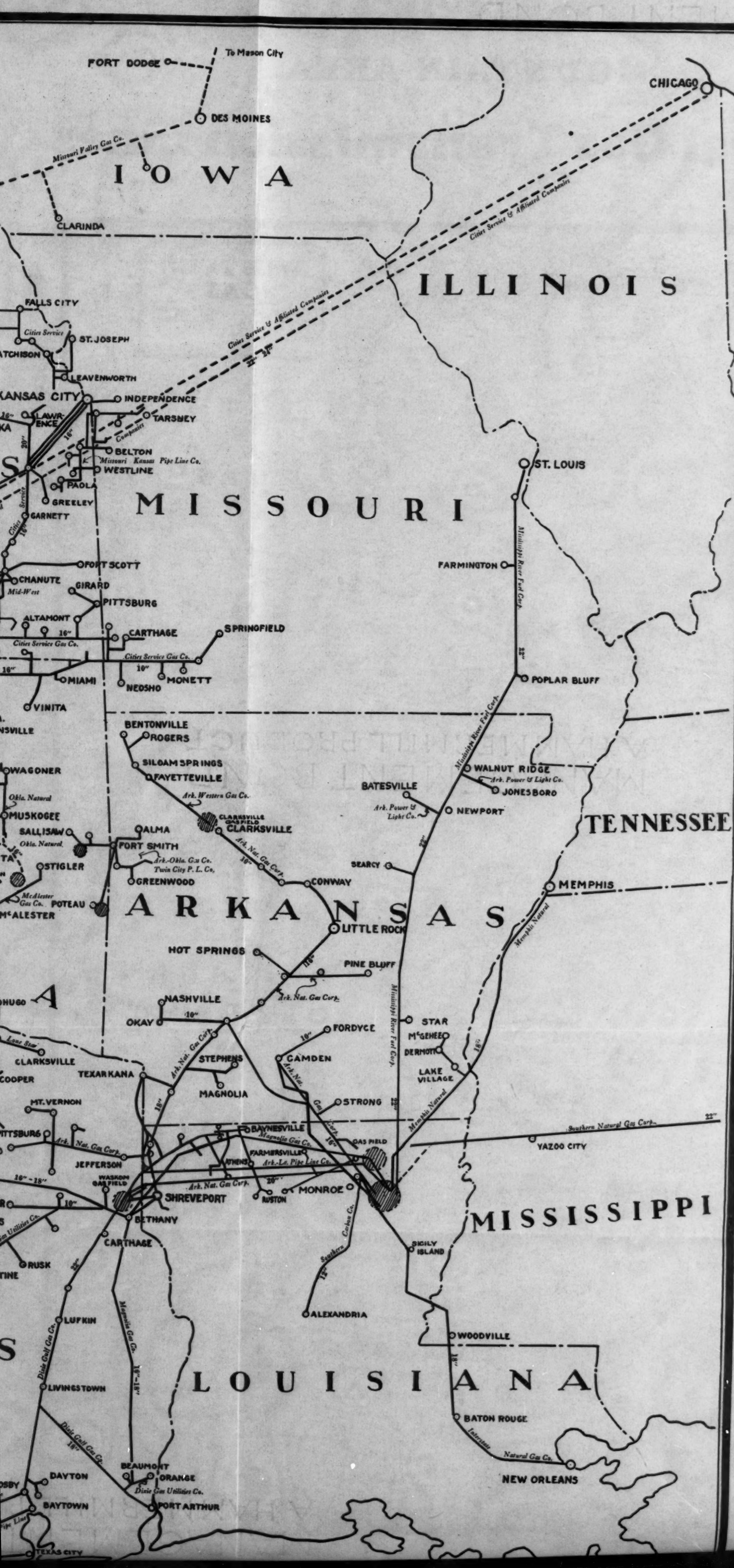
RYCADE GAS FIELD

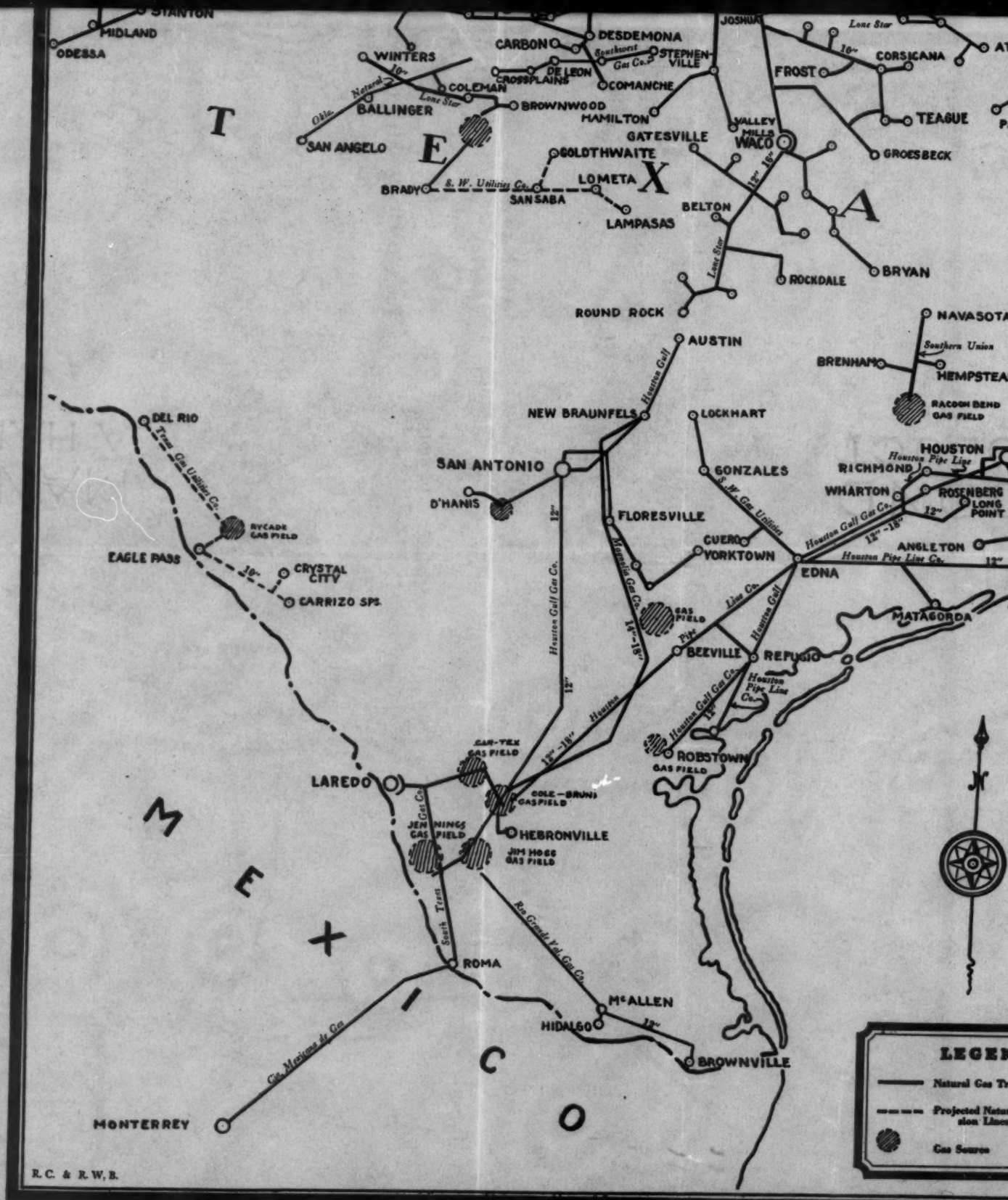
ther detail of in Nebraska, Oklahoma and see *Western* of Mid-Conti-id-West Area.

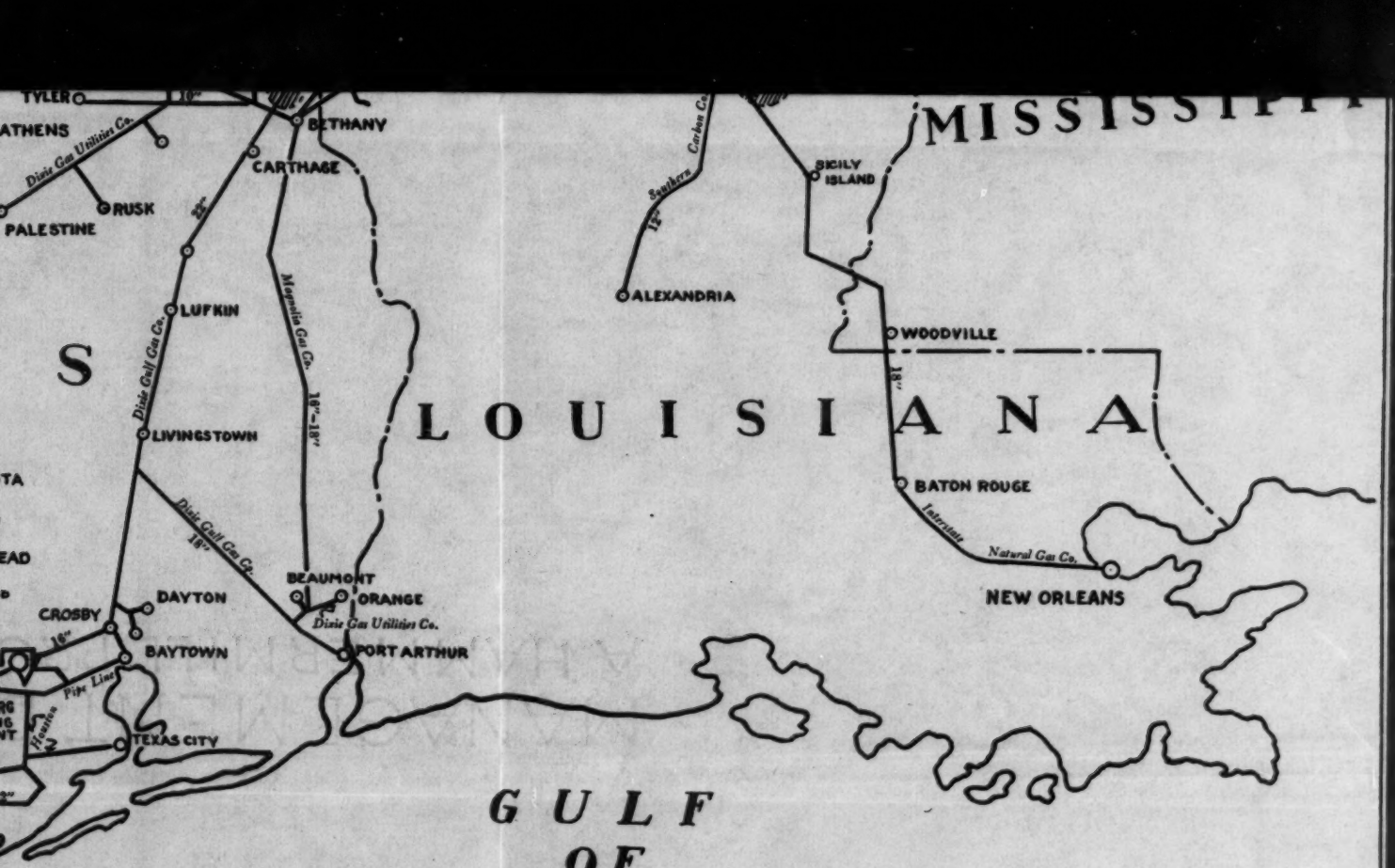

COALVILLE
Wasatch Gas Co.
LYMAN
Uinta Pipe Line Co
Mountain Fuel Supply
GARFIELD
MIDVALE
SALT LAKE CITY
SANDY
CLAY BASIN
HIAWATHA DOME
PROVO
LARAMIE
CHEYENNE
Colorado, Wyoming Gas Co.
FORT COLLINS
LOVELAND
GREELY
BERTHOUD
JOHNSTOWN
LONGMONT
ARVADA
Colorado-Wyoming Gas Co
DENVER
LITTLETON
UTAH
COLORADO
Colorado Interstate Gas Co.
FOUNTAIN
PUEBLO
ROCKYFORD
FORT LYONS
LA JUNTA
DURANGO
Mesa Grande Gas Co
UTE DOME GAS FIELD
FARMINGTON
Colorado Interstate
LEGEND
Natural Gas Transmission Lines (Including Lines in Progress)
Projected Natural Gas Transmission Lines
Gas Source
OKLA
CLAYTON
TEXLINE
Canadian River
DALHART
Southern Union Gas Co.
S.U.G.Co.
SANTA FE
BERNALILLO
ALBUQUERQUE
ARIZONA
TUCUMCARI
AMARILLO
South Plains Pipe Line Co.
HEREFORD
NEW
MEXICO
Gas Co. of New Mexico
CLOVIS
FARWELL
KRESS
PORTALES
So. Pls. P.L.Co.
SUDAN
ROSWELL
LEVELAND
LUBBOCK
Pecos Valley Gas Co.
BROWNFIELD
ARTESIA
MALJAMAR GAS FIELD
SEMINOLE
GRAVES
LA MESA
CARLSBAD
JAL GAS FIELD
EL PASO
YSLETA
CLINT
FABENS
El Paso Natural Gas Co.
WINKLER COUNTY GAS FIELD
So. Pls. P.L.Co.
MIDLAND
ODESSA
PECOS
COYOTE
Southern Union Gas Co
MEXICO


RASKA
or further detail of
s lines in Nebraska,
ansas, Oklahoma and
exas, see Western
s map of Mid-Conti-
nt—Mid-West Area.
KANSAS
S
AHOMA
iver Gas Co.
RT
AMARILLO GAS
GAS FIELD
NYON
HAPPY
TULIA
SILVERTON
TURKEY
PLAINVIEW
LOCKNEY
FLOYDADA
X A S
CROSBYTON
SLATON
POST
uthern Plains Pipe Line Co.
SA
sumers Natural Gas & Power Co
BIG SPRING
NTON
ID
R.C. & R.W.B.
MIDLAND
ODESSA
WINTERS
Natural
Lone Star
COLEMAN
BALLINGER
Ohio
SAN ANGELO
CROSSPLAINS
DE LEON
COMANCHE
BROWNWOOD
HAMILTON
GATESVIL
GOLDTHWAITE
BRADY
S. W. Utilities Co.
SAN SABA
LOMETA
LAMPASAS
T E X
ROUND ROCK
Houston Gulf
NEW BRAUNFELS
DEL RIO
Trans Gas Utilities Co.
SAN ANTONIO
D'HANIS
FLORESVI
RYCADE
GAS FIELD
EAGLE PASS
10"
CRYSTAL
CITY
CARRIZO SPS.
Houston Gulf Gas Co.
12"
Magnolia Gas Co.
14"-18"
Houston
CAR-TEX
GAS FIELD
12"-18"
LAREDO
COLE-BRUNI
GAS FIELD
JENNINGS
GAS FIELD
HEBRONVILLE
JIM HOGG
GAS FIELD
M E X I C O
South Texas
Rio Grande Val. Gas Co.
ROMA
McALLE
HIDALGO
Gas Marketing & Co.
MONTERREY
R.C. & R.W.B.

NEBRASKA
KANSAS
OKLAHOMA
TEXAS
SIOUX CITY
Missouri Valley Gas Co.
OMAHA
GRAND ISLAND
LINCOLN
HASTINGS
Kansas Pipe Line & Gas
Lone Star & Affiliated Companies
SUPERIOR
SMITH CENTER
SABETHA
CONCORDIA
OSBORNE
CLAY CENTER
LURAY
K. P. L. & Gas
MANHATTAN
TOPEKA
RUSSELL
ABILENE
ENTERPRISE
SALINA
HOPE
LA CROSSE
Kan. Pipe Line & Gas
Cities Service
LYONS
EMPORIA
GREAT BEND
LARNED
HUTCHINSON
K. P. L.
NEWTON
MADISON
Consol. Gas Utilities
WICHITA
DODGE CITY
Argus Gas Co.
PRATT
HAVILAND
Kansas Pipe Line & Gas
PETROLIA STA.
Cities Service Gas Co.
STEPHENS COUNTY GAS FIELD
FOWLER
HUGOTON
SATANTA
MEADE
Public Service Co. of Kan.
ALTOONA
INDEPENDENCE
ELKHART
ASHLAND
COLDWATER
MEDICINE LODGE
ANTHONY
BARBER COUNTY GAS FIELD
HARDTNER
CORWIN STA.
CALDWELL
ARKANSAS CITY
GUYMON
TYRONE
HOOKER
FORGAN
BEAVER
Cimarron Utilities
TEXHOMA
CAPRON
SUPPLY
Public Service Corp. of Texas
MEDFORD
CHEROKEE
Carlton Pipe Line Co.
FOLLETT
AVARD
BARTLESVILLE
PERRYTON
FARGO
WAYNOKA
Pub. Serv. Corp. of Texas
MOORELAND
SPEARMAN
SHATTUCK
QUINLAN
ENID
PONCA CITY
FAIRFAX
TALLANT STA.
WOODWARD
FAIRVIEW
Consol. Gas Utilities Co.
HENNESSEY
OKEENE
Kingfisher Co. Gas Co.
KINGFISHER
GUTHRIE
TULSA
AMARILLO GAS FIELD
HIGGINS STA.
MIAMI
WATONGA
BRISTOW STA.
AMARILLO
WEATHERFORD
ELK CITY
HEREFORD
CANYON
Southern Union Line
TEXOLA
SAYRE
SHAMROCK
EL RENO
OKLAHOMA CITY
SHAWNEE
NORMAN
HENRIETTA
Northern Texas
MANGUM
MOUNTAIN PARK
APACHE
ACME
CHICKASHA
LEXINGTON
HOLDENVILLE
TULIA
South Plains Pipe
South Plains
TURKEY
HOLLIS
ALTUS
FORT SILL
Consol. Gas
FREDERICK
QUANAH
ADA
PLAINVIEW
LOCKNEY
FLOYDADA
Lone Star
OIL CITY
TISHOMINGO
OKLA-UNION
BURKBURNETT
Stamford & Western Gas Co.
ARDMORE
MADILL
DURANT
LEVELAND
LUBBOCK
CROSBYTON
TRUSCOTT
WICHITA FALLS
PARIS
BROWNFIELD
SEYMOUR
GAINESVILLE
POST
BRIEN
LEONARD
ANNA
BRYSON
DENTON
BRIDGEPORT
Mc KINNEY
LA MESA
STAMFORD
GREENVILLE
SNYDER
RUBY
ANSON
ALBANY
BRECKENRIDGE
BRAZOS
FORT WORTH
DALLAS
WINNSBORO
Consumers Nat. Gas & Power
SWEETWATER
BIGSPRING
COLORADO
GORDON
JOSHUA
KAUFMAN
TYLER
STANTON
MIDLAND
ODESSA
CARBON
DESDEMONA
Southwest Gas Co.
STEPHENVILLE
CORSICANA
ATHENS
WINTERS
DE LEON
CROSSPLAINS
COMANCHE
FROST
COLEMAN
BROWNWOOD
HAMILTON
TEAGUE
PALESTINE
BALLINGER
SAN ANGELO
GATESVILLE
WACO
GROESBECK
GOLDTHWAITE
BRADY
S. W. Utilities Co.
SAN SABA
LOMETA
LAMPASAS
BELTON
ROCKDALE
BRYAN
ROUND ROCK
AUSTIN
NAVASOTA
BRENHAM
HEMPSTEAD
RACCOON BEND GAS FIELD
DEL RIO
NEW BRAUNFELS
LOCKHART
SAN ANTONIO
GONZALES
HOUSTON
RICHMOND
WHARTON
ROSENBERG
LONG POINT
D'HANIS
FLORESVILLE
RYCADE GAS FIELD


To Mason City
FORT DODGE
DES MOINES
CHICAGO
Missouri Valley Gas Co.
IOWA
CLARINDA
Cities Service & Affiliated Companies
ILLINOIS
FALLS CITY
Cities Service
ST. JOSEPH
ATCHISON
LEAVENWORTH
KANSAS CITY
INDEPENDENCE
LAWRENCE
TARSNEY
BELTON
Missouri Kansas Pipe Line Co.
WESTLINE
PAOLA
GREELEY
GARNETT
MISSOURI
ST. LOUIS
FARMINGTON
Mississippi River Fuel Corp.
FORT SCOTT
CHANUTE
Mid-West
GIRARD
PITTSBURG
ALTAMONT
CARTHAGE
SPRINGFIELD
Cities Service Gas Co.
MIAMI
NEOSHO
MONETT
POPLAR BLUFF
VINITA
BENTONVILLE
ROGERS
SILOAM SPRINGS
FAYETTEVILLE
WAGONER
Okla. Natural
MUSKOGEE
SALLISAW
Okla. Natural
Ark. Western Gas Co.
CLARKSVILLE GASFIELD
CLARKSVILLE
ALMA
FORT SMITH
Ark.-Okla. Gas Co.
Twin City P. L. Co.
STIGLER
GREENWOOD
Ark. Nat. Gas Corp.
CONWAY
SEARCY
BATESVILLE
Ark. Power & Light Co.
NEWPORT
WALNUT RIDGE
Ark. Power & Light Co.
JONESBORO
TENNESSEE
MEMPHIS
McALESTER
McAlester Gas Co.
POTEAU
ARKANSAS
LITTLE ROCK
Memphis Natural
HOT SPRINGS
PINE BLUFF
Mississippi River Fuel Corp.
NASHVILLE
OKAY
Ark. Nat. Gas Corp.
STAR
McGEHEE
DERMOTT
LAKE VILLAGE
FORDYCE
CAMDEN
STEPHENS
MAGNOLIA
TEXARKANA
CLARKSVILLE
COOPER
STRONG
MT. VERNON
BAYNESVILLE
Magnolia Gas Co.
GAS FIELD
Southern Natural Gas Corp.
YAZOO CITY
FARMERSVILLE
ATHENS
Ark.-La. Pipe Line Co.
JEFFERSON
WASSON GASFIELD
SHREVEPORT
RUSTON
MONROE
BETHANY
CARTHAGE
RUSK
MISSISSIPPI
SICILY ISLAND
Southern Carbon Co.
ALEXANDRIA
WOODVILLE
LUFKIN
Dixie Gulf Gas Co.
Magnolia Gas Co.
LIVINGSTOWN
LOUISIANA
BATON ROUGE
Interstate Natural Gas Co.
NEW ORLEANS
BEAUMONT
ORANGE
Dixie Gas Utilities Co.
DAYTON
BAYTOWN
PORT ARTHUR
TEXAS CITY


STANTON
MIDLAND
ODESSA
WINTERS
10"
COLEMAN
Natural
Lone Star
Okla.
BALLINGER
SAN ANGELO
BRADY
S. W. Utilities Co.
CARBON
DESDEMONA
Southwest Gas Co.
STEPHENVILLE
DE LEON
CROSSPLAINS
COMANCHE
BROWNWOOD
HAMILTON
GOLDTHWAITE
LOMETA
SANSABA
LAMPASAS
JOSHUA
Lone Star
10"
CORSICANA
FROST
TEAGUE
VALLEY MILLS
WACO
GATESVILLE
GROESBECK
12" 16"
BELTON
ROCKDALE
BRYAN
ROUND ROCK
AUSTIN
Houston Gulf
NAVASOTA
Southern Union
BRENHAM
HEMPSTEAD
RACCOON BEND GAS FIELD
NEW BRAUNFELS
LOCKHART
HOUSTON
Houston Pipe Line
RICHMOND
SAN ANTONIO
GONZALES
S. W. Gas Utilities
WHARTON
ROSENBERG
LONG POINT
Houston Gulf Gas Co.
12"
12" -16"
D'HANIS
FLORESVILLE
Houston Gulf Gas Co.
12"
Magnolia Gas Co.
CUERO
YORKTOWN
ANGLETON
Houston Pipe Line Co.
EDNA
DEL RIO
Texas Gas Utilities Co.
RYCADE GAS FIELD
EAGLE PASS
10"
CRYSTAL CITY
CARRIZO SPS.
GAS FIELD
14"-18"
Houston Gulf Gas Co.
Houston Gulf
Line Co.
MATAGORDA
BEEVILLE
REFUGIO
Houston Gulf Gas Co.
12"
Houston Pipe Line Co.
Houston
12" -18"
SAN-TEX GAS FIELD
ROBSTOWN GAS FIELD
LAREDO
COLE-BRUNI GAS FIELD
JENNINGS GAS FIELD
JIM HOGG GAS FIELD
HEBRONVILLE
South Texas
Rio Grande Val. Gas Co.
ROMA
McALLEN
HIDALGO
12"
BROWNVILLE
Co. Mexicana de Gas
MONTERREY
MEXICO
LEGEND
Natural Gas Tr
Projected Natu
sion Lines
Gas Source
R.C. & R.W.B.



MID-CONTINENT—MID-WEST AREA

Natural Gas Transmission Lines

END

Transmission Lines

Natural Gas Transmis-
Lines

WESTERN GAS

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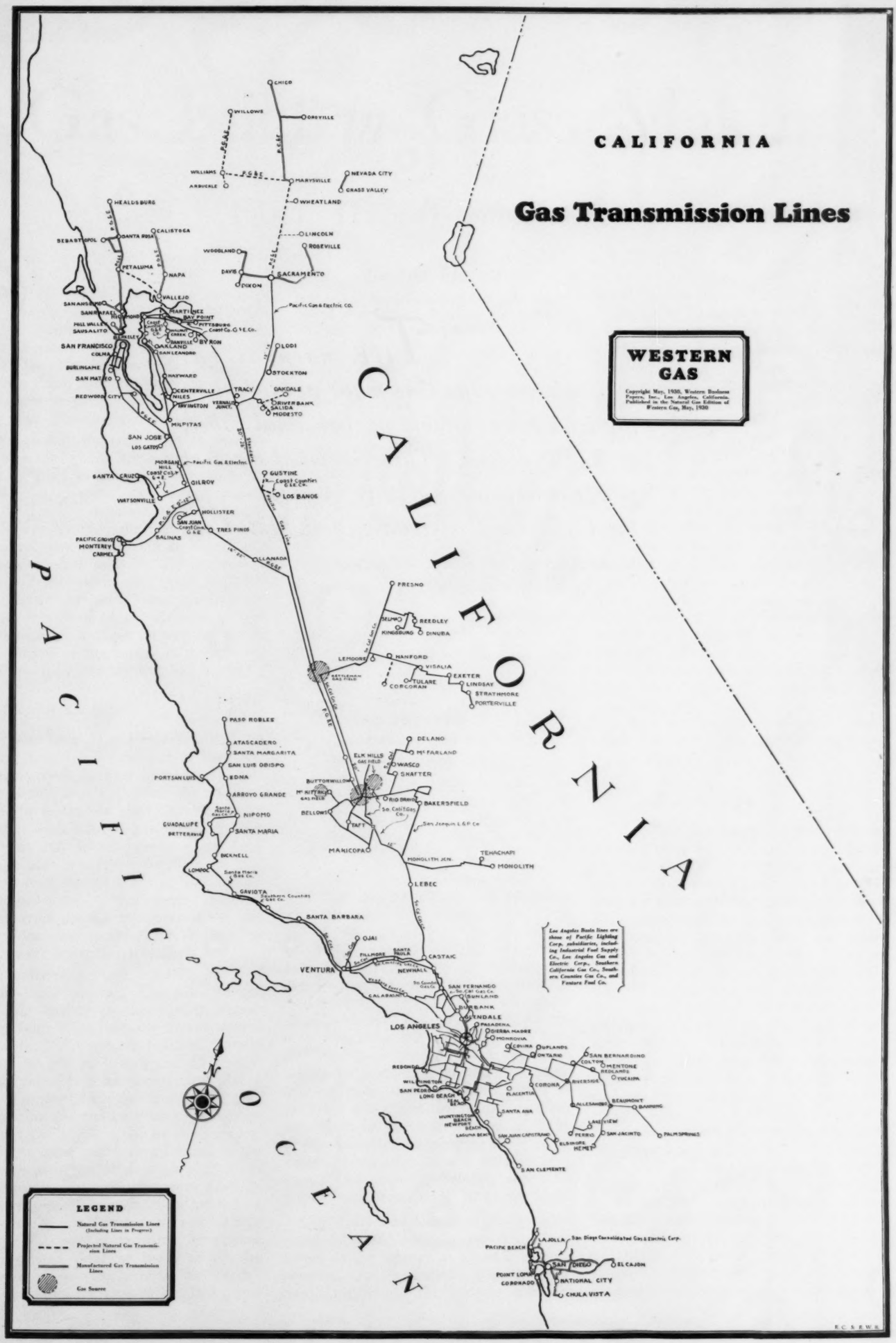
CALIFORNIA
Gas Transmission Lines
WESTERN GAS
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PACIFIC OCEAN
CALIFORNIA
Los Angeles Basin lines are those of Pacific Lighting Corp. subsidiaries, including Industrial Fuel Supply Co., Los Angeles Gas and Electric Corp., Southern California Gas Co., Southern Counties Gas Co., and Ventura Fuel Co.
LEGEND
Natural Gas Transmission Lines (Including Lines in Progress)
Projected Natural Gas Transmission Lines
Manufactured Gas Transmission Lines
Gas Source
CHICO
WILLOWS
ORDVILLE
WILLIAMS
ARBUCKLE
MARYSVILLE
NEVADA CITY
GRASS VALLEY
WHEATLAND
HEALDSBURG
SEBASTOPOL
SANTA ROSA
CALISTOGA
PETALUMA
NAPA
VALLEJO
LINCOLN
ROSEVILLE
WOODLAND
DAVIS
DIXON
SACRAMENTO
SAN RAFAEL
MARTINEZ
BAY POINT
PITTSBURG
MILL VALLEY
SAUSALITO
BERKELEY
OAKLAND
SAN LEANDRO
SAN FRANCISCO
COLMA
BURLINGAME
SAN MATEO
REDWOOD CITY
HAYWARD
CENTERVILLE
NILES
IRVINGTON
TRACY
VERNALIS JUNCT.
BYRON
LODI
STOCKTON
OAKDALE
RIVERBANK
MODESTO
MALPITAS
SAN JOSE
LOS GATOS
MORGAN HILL
SANTA CRUZ
GILROY
WATSONVILLE
HOLLISTER
SAN JUAN
BALINAS
TRES PINOS
PACIFIC GROVE
MONTEREY
CARMEL
GUSTINE
LOS BANOS
PRESNO
SELMA
KINGSBURG
REEDLEY
DINUBA
LEMOORE
HANFORD
VISALIA
EXETER
LINDSAY
STRATHMORE
PORTERVILLE
TULARE
CORCORAN
KETTLEMAN GAS FIELD
PASO ROBLES
ATASCADERO
SANTA MARGARITA
SAN LUIS OBISPO
PORTSAN LUIS
EDNA
ARROYO GRANDE
NIPOMO
GUADALUPE
BETTERAVIA
SANTA MARIA
LOMPOC
GAVIOTA
DELANO
Mc FARLAND
WASCO
SHAFTER
ELK HILLS GAS FIELD
BUTTONWILLOW
Mc KITTRICK GAS FIELD
RIO BRAVO
BAKERSFIELD
BELLOWS
So. Calif. Gas Co.
TAFT
San Joaquin L. & P. Co.
MARICOPA
MONOLITH JCN.
TEHACHAPI
MONOLITH
LEBEC
SANTA BARBARA
OJAI
FILLMORE
SANTA PAULA
CASTAIC
VENTURA
NEWHALL
SAN FERNANDO
So. Calif. Gas Co.
SUNLAND
CALABASAS
BURBANK
GLENDALE
PASADENA
SIERRA MADRE
MONROVIA
LOS ANGELES
COVINA
UPLAND
ONTARIO
SAN BERNARDINO
COLTON
MENTONE
REDLANDS
YUCAIPA
REDONDO
WILMINGTON
SAN PEDRO
LONG BEACH
SEAL BEACH
CORONA
RIVERSIDE
PLACENTIA
ALESSANDRO
BEAUMONT
BANNING
SANTA ANA
HUNTINGTON BEACH
NEWPORT BEACH
LAGUNA BEACH
SAN JUAN CAPISTRANO
PERRIS
SAN JACINTO
PALM SPRINGS
ELSINORE
HEMET
SAN CLEMENTE
LA JOLLA
San Diego Consolidated Gas & Electric Corp.
PACIFIC BEACH
SAN DIEGO
EL CAJON
POINT LOMA
CORONADO
NATIONAL CITY
CHULA VISTA

THE natural gas transmission pipe line maps published in this issue are available on cloth-lined paper, at $2.00 per set. Three regional maps of gas transmission lines are included — for the California, Mountain, and Mid-Continent — Mid-West areas.

Address
WESTERN GAS
124 West Fourth Street,
Los Angeles, California

Gas Fuel *in* Glass Making

PART II: *Window Glass*

By LEE HOLTZ

General Superintendent, Manufacture and Distribution, Southern California Gas Company

Following his introduction on the subject of gas in the manufacture of glass, published last month, Mr. Holtz now treats a specific article—window glass. As usual in his discussions of industrial applications, the author provides the background which can well serve an industrial sales representative in meeting prospects in the fields covered.

Lee Holtz

Technical phases of combustion and firing, and gas application in making milk bottles, prescription ware, glass hardware, fancy ware and plate glass are some of the subdivisions to be discussed in future installments.—Editor.

WINDOW glass is so commonplace today that it is difficult to realize that sometime less than 300 years ago glass windows were so rare that only the very rich could afford to own them, and very often the window frames were packed away for safe keeping when the family were not at home.

Progress in the technology of window glass manufacture began some 20 years ago. This was due to the ingenuity of a Belgian inventor who was successful in designing a machine to draw glass. This was not only the turning point in window glass making, but an historically important date as well, and because of this advancement the great sculptor Constantin Meunier, who glorified in labor, was inspired to cast into bronze an image of a glass blower to enable the worker of the future to understand how much lighter his task had become.

Pot House Days

It has been just 19 years since the writer was first introduced to the glass industry and, harking back to the subject of this article, the introduction was made in a window glass factory in connection with natural gas fuel. At this point it may be of interest to go back to the old "pot house days" when half naked men by the force of their lungs fashioned the incandescent material taken from the flaming ports of the furnace into glass cylinders or "rollers" as they were more often called.

Usually the "pot houses" were of frame construction. The sides of the building opened to the outside atmosphere with large movable louver slatted windows. An oblong furnace, usually about 30 feet in length and 15 feet in width for a 15-shop factory, was placed in the center of the building. The pots containing the molten glass were located around the inside walls of the furnace. The gathering ports were located in the furnace wall just above each pot. Usually furnaces of this type were fired by a battery of Bunsen burners located at the rear of the furnace, or the feeding end. The pots were filled by raising an insulated door at the rear of the furnace. The raw material or "batch" was picked up with a long handled metal scoop by a workman known as the "teaser" and dumped into the pots. The handle of the scoop was possibly 40 feet in length and was supported by a cable with a swivel connection from the roof of the factory.

Every factory had its own pot makers. The pots were made of clay materials, and the clay was prepared in large oblong wooden boxes. The workman would first place a layer of very plastic fireclay some 6 inches in thickness in the box, and then would get into the box in his bare feet and walk with short steps from one end of the box to the other, pugging the clay with his feet. After he had completely walked over this entire surface, he would then place another layer of clay some 6 inches in thickness and repeat this operation. This seemed to be the best method of thoroughly kneading or pugging the clay to prevent lamination in the finished product. The pots were usually about 30 inches in diameter and 36 inches high.

Gas fuel was measured by proportional valve displacement meters and was served at the furnace at about 2 pounds pressure. An indication of good firing conditions within the furnace was denoted by the flame lick from the port holes. The flame licks were known as "fox tails." When the "fox tails" were of the right color and length, it signified that the internal pressure and temperature of the tank were satisfactory. Few pyrometers, if any, were used. Possibly one thermocouple would be used and would be placed in the center of the furnace crown. It was the "teaser's" job to keep the proper viscosity of the material in the pots, and he did an excellent job by watching the "fox tails" to control the tank temperature.

The glass industry at this time was made up of perhaps the most peculiar class of workers of all mechanical trades. They were so organized that only the father, son, uncle or brother of a glass worker could enter the business to learn the trade. This was true in every position in the factory, except that of "roller boy" and "snapper," which will be explained later, and there is no question but that the strictness of this organization hastened the day of machine-drawn glass.

Hand-Blown Glass

The first operation of hand-blown window glass was that of gathering on the end of an iron blowpipe a certain amount of molten glass. This workman was known as the "gatherer." After the proper amount had been gathered, the blowpipe and glass ball was then passed to the "blower." He in turn would start the cylinder by blowing into this ball and turning it at a high rate of speed hand propelled in a wooden box which was placed on the floor and filled with sawdust. This operation enlarged the ball to about 14 inches in diameter. It was then taken to a "swing pit" and elongated by swinging and reheating at regular intervals. The finished ring or "roller" was about 16 inches in diameter and some 6 feet in length. The "rollers" were then laid on racks and the blowpipe detached by taking a small amount of molten glass on the end of a rod in one hand and catching a portion of it with a pair of tongs with the other hand and pulling it into a string or thread as one would pull taffy, and then placing it around the ring some 6 or 8 inches

from the end of the blowpipe. The temperature differential at this point through the weight of the blowpipe caused a very clean break. The blowpipe was then cleaned and the process of blowing another ring was commenced.

After a number of these "rollers" had been placed on the racks, the man known as the "snapper" would then throw a handful of sawdust into each ring and run a red hot rod lengthwise of the cylinder where again the heat differential would cause a snap or clean break. These "rollers" were then placed on a one-wheel rack cart by the "roller boy" and taken to the flattening oven, which was usually in the basement of the factory. The flattening oven had three openings—one for charging, one for the use of the flattening tools, and the third for removing the flattened sheets. The "rollers" were laid on a revolving stone table within the oven, which was kept at a temperature sufficient to just heat the cylinder enough to allow it to flatten out. The revolving table was then moved to a position in

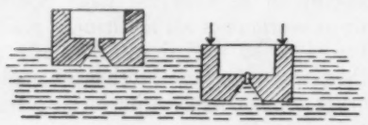


Fig. 1. Showing the effect of depressing the slotted drawing block.

front of the "flattener" who finished the flattening process with a long-handled ironer which had a hard wooden slab fastened at the end. A long-handled fork with many prongs was then shoved beneath the sheet, which was placed on a rack to one side of the revolving table and within the oven. The sheets were then gradually moved out of the oven and slowly cooled. From this point the sheet glass was then sent to the annealing ovens prior to cutting. The "cutters" would then sort and cut to get the most out of a sheet, as they were paid by the box and received the greatest remuneration for the best glass obtained.

One interesting feature in this method of window glass manufacture was this: If the product became broken anywhere along the line from the gathering to the finished product, every workman who had had anything to do with it lost his portion of the pay for that particular piece.

Another interesting feature was the kind of fire that was used by the workmen in "glory hole" heating. A Belgian glass worker would insist upon flame bordering on reduction; in fact a fire that was very smoky was known as a "Belgiam fire." As a rule an American-trained blower could not use this type of fire. He insisted upon one more oxidized and could not turn out the same quality of ware as that turned out by the Belgian, if he tried to use the "Belgian fire." However, both workmen after adjusting furnace conditions to suit their training, could turn out the same quality and kind of work.

It is quite possible that at the present time the pot method of heating window glass materials is extinct in this country; in fact, hand-blown window glass of any description is rapidly being replaced by the more modern drawing machine product.

One of the most interesting, as well as successful, machine methods is that of the Fourcault System for drawing sheet glass, and by reason of the fact that the writer was in very close contact at one time with a plant in southern California thus equipped, a brief description of the process will be given. The process was invented by Emile Fourcault of Belgium, and patented after many years of research. The inventor felt that the principle was wrong to first make a cylinder to obtain a flat piece of glass. Why this roundabout way? Why not try to replace this method by a procedure which permits the making of a sheet?

The foundation of the system is the principle illustrated diagramatically in Fig. 1. Place in a tank of molten glass a slotted refractory block made of material of lesser density than that of the glass and shaped approximately as shown in the diagram, with the upper lips of the slot at a lower level than the top and outer edges of the block, and it will float with the lips of the slot lower than the surface of the molten glass. If pressure from above is applied to the upper surface of the floating block (called in the Fourcault System the "debiteuse" or drawing block) and the block is immersed in the glass to a point where the upper edge of the slot lies below the level of the surface of the glass, the pressure from the glass surrounding the block will cause some of the glass to float upward through the slot, toward the same level as the surface of the main body of glass.

The idea is simply to remove this upward-flowing glass from the top of the slot at exactly the same rate as it comes through from the bottom. This results in a continuous flow of glass, kept up as long as the relative position of the drawing block to the surface of the glass is maintained.

The machine consists, as indicated in the diagram Fig. 2, of a vertical series of asbestos covered steel rollers placed in pairs over the working furnace, directly above the drawing block. The sheet of glass carried up from the tank passes between the rollers of each pair in turn. The lifting force is transferred from the rollers to the glass by means of friction, the glass being in close contact with both rollers all the way across the sheet. Each pair of rollers is geared together. The rollers on one side of the sheet of glass revolve in fixed bearings, but on the opposite side means are

(Continued on Page 136)

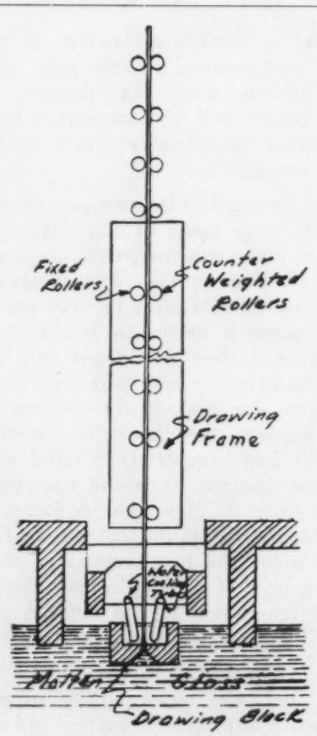


Fig. 2. Essential features of the Fourcault method.

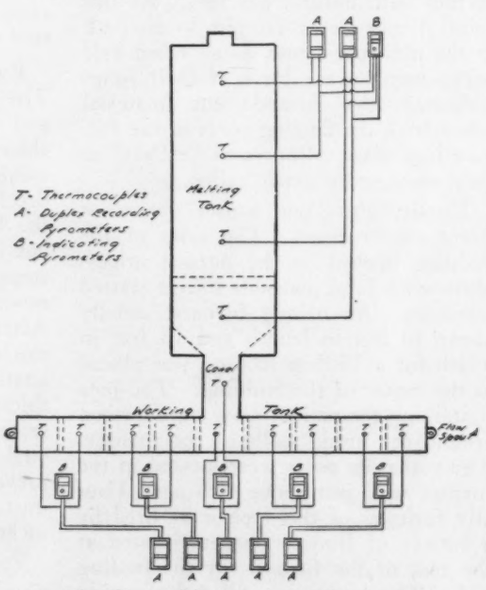


Fig. 3. Melting and working tanks showing instrument layout and wiring of pyrometer system

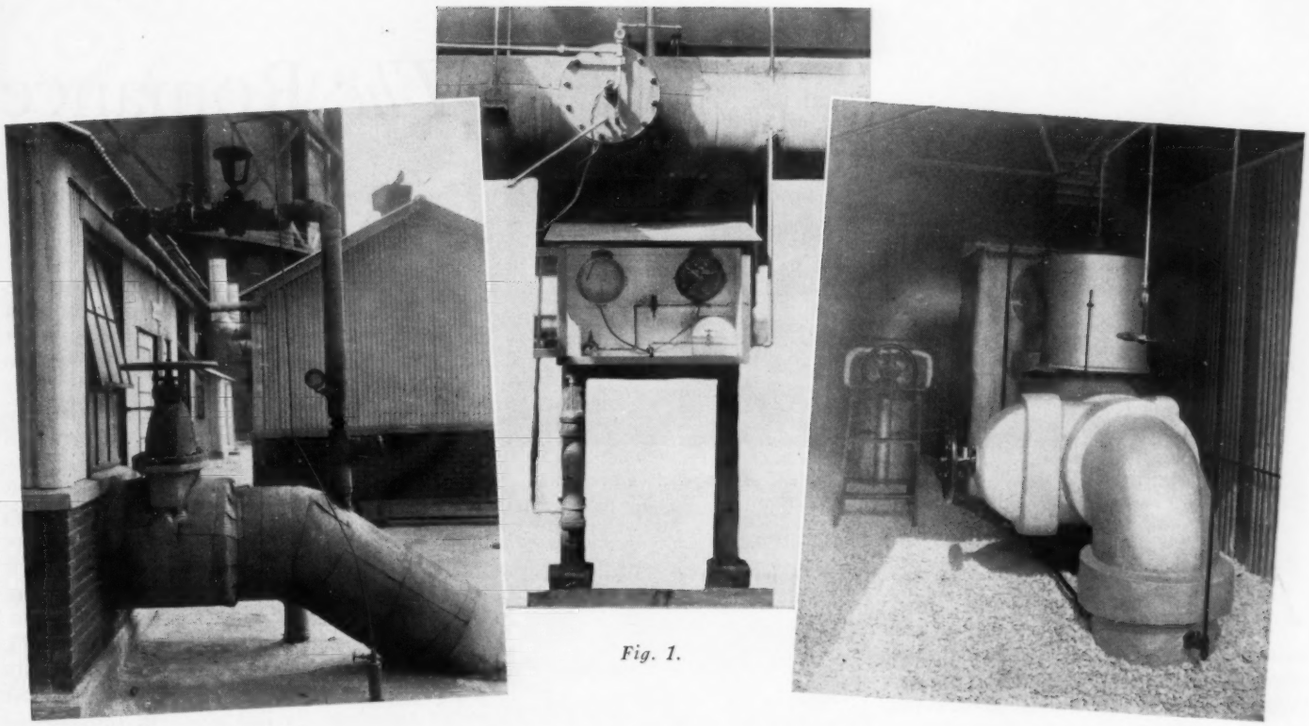


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1. Automatic controller, wet and dry bulb recording hygrometer and installation of wet, dry and controller bulbs in medium pressure main. Fig. 2. Two-inch triangle port diaphragm motor valve, controlled by automatic controller shown in Fig. 1. Fig. 3. Typical installation of oil scrubbing equipment, at a 16-inch district regulator.

Rehydration Methods *in* New Orleans

By A. E. MERCHANT

General Superintendent Gas Department, New Orleans Public Service, Inc.

NATURAL gas was first turned into the system of the New Orleans Public Service in August, 1928. Since that time all the gas has been rehydrated.

Our distribution system consists of a medium pressure belt line around the city with 12 regulator stations, which feed from this belt into the low pressure (6-inch H_2O) system, and in addition we have three commercial holders, ranging from 5,000,000 cubic feet capacity to 1,000,000 cubic feet, which are used not only for storage but for feeding into the low pressure system when gas is needed.

It so happens that all gas used by the low pressure system enters through the old gas plant, where manufactured gas has been made since 1835. At this point we decided to set up our boiler plant, consisting of two gas-fired automatic boilers of 20 and 18 H.P. These boilers supply the steam which is sprayed into the gas, entering the medium pressure system through an automatically controlled steam nozzle. The control is so regulated as to cause the gas to become 100 per cent saturated with water vapor, and to use the latent heat from the steam to raise the saturated gas temperature to correspond to our highest main temperature, so that the gas will have a tendency to cool upon entering the distribution system and thus prevent any possibility of a loss of humidity, due to temperature changes.

A. E. Merchant

At the 12 different regulator stations, there is an oil scrubber tank. Inside the tank is a baffle plate and a number of wooden grids spaced ½ inch apart. The gas entering the scrubber comes in contact with the oil vapor, which is sprayed by an oil spray, located on the top of the scrubber. The oil is fed to the spray by gravity from an elevated storage tank and is atomized by gas taken from the high side of the regulator, with the result that a fine mist of oil is continuously in the path of the gas. In order to prevent the atmospheric temperature from affecting the temperature of the gas flowing through the regulator and scrubber, all of the regulating and oil scrubbing equipment has been insulated.

With this set-up we get water and a small deposit of oil in practically all of our drips. Saturation tests made at various points in our distribution system indicate that we are maintaining throughout our system an average saturation of 75 to 85 per cent. Our unaccounted-for gas expressed as a percentage of the domestic output has not increased, but has decreased slightly since the conversion was made.

Our saturation plant has taken care of the maximum demand made on the plant this winter, which was for 25,000,000 cubic feet for domestic use. On this peak day we had no difficulty in maintaining 100 per cent saturation on the gas leaving the plant.

(Continued on Page 132)

In 1835 the fore-runner of this modern gas plant was erected on the same site in New Orleans.

The Romance

By A. B. PATERSON

AS we think of the various sections of our country, "in the olden days," many pictures arise in our mind. New England connotes hardy, thrifty folk, and maple syrup; the far West conjures up visions of covered wagons and rough adventurers, intent on the mining of gold and silver; similarly, the South brings to mind broad expanses of rolling country where plantations operated by negro slaves meant the chief source of livelihood. The thought of negro labor has therefore come to be synonymous with the thought of the South.

The idea of slavery immediately suggests old southern aristocracy . . . . bewhiskered colonels, crinolined ladies, mint juleps, fields of snowy cotton, plantation homes pillared by great white columns, and scores of humble blacks, ready to carry out smilingly the slightest request of master or lady. The literature of the Southland has painted an enticing picture of life for the upper classes about 1860. Far outside the scope of this leisurely existence was any thought of business. And yet one of the most progressive and far-sighted business enterprises of the day was intimately bound up with the tradition of slavery. For the first gas plant built in the city of New Orleans was operated by slave labor.

The New Orleans Gas Light & Banking Company, the first incorporated gas company in New Orleans, has the unique distinction of being the only gas company in the history of the American gas industry to hold legal title to its employees, whose value was included in the capital investment of the company on which its earnings were premised. This is not hard to understand when we recall that the early development of the gas company came at a time when the institution of slavery was at its height. The carefully preserved records of that early company disclose some interesting sidelights on the operation of the business. Here are listed:

Negro Man, Tom, 38 at		$1500.00
Negress Diana, 28 at		$1000.00
Their Children, Letitia, 9; Hamit, 7; Amanda, 5 at		$1500.00
And these figures tell us the estimated cost of slave labor:		
The cost of a young negro man may be estimated at		$ 900.00
Interest on $900.00 at 8%	$72.00	
Annual depreciation of slave including risk of life, accidents, etc	50.00	122.00
Cost of boarding, clothing, doctor bills, gratuities, etc., per annum		100.00
Total per annum for a slave laborer		$ 222.00
If required to labor on Sunday, 50c per Sunday		26.00
Total for 365 days		$ 248.00

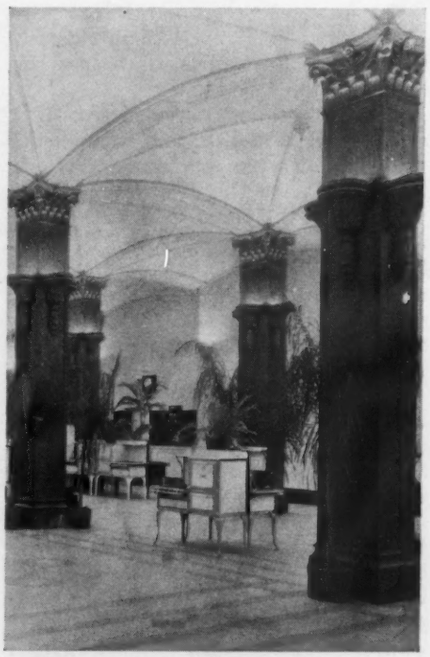
Another document revealed an interesting comparison between the cost of slave labor and white labor, with a considerable amount showing in favor of the slaves. A white carpenter, mason and blacksmith, employed during the year, together with eight ordinary laborers, would cost about $6,573.00. Slaves having the same qualifications would cost about $2,811.00, showing a balance of $3,762.00 in favor of the slaves.

"Quarters" for the negroes adjoined the gas plant where they worked, part of one side being run up for three stories, forming a sort of dormitory. On the first floor were dining room and kitchen; above were sleeping quarters. Surrounding the old square were brick walls 15 feet high, with handsome iron gates guarding the entrance. That these slaves were well treated is attested by an old newspaper account of the funeral of one of the gas company's early presidents, Colonel W. S. Campbell:

"A striking feature of the funeral ceremonies was the presence of a large number of slaves of the gas company, who, dressed in their neat attire, and bearing themselves with the greatest propriety, marched in the procession even in advance of many of the white friends of the deceased. When the religious rites were concluded, the grief of the Africans sought relief in loud sobbing and in the most expressive evidences of sincere affection. It is well known that these negroes have always been subjected to a strict discipline but a kind and just treatment, and it attests the admirable working of our social system, as well as the noble qualities of our deceased friend, that such manifestations should be made by those to whom he had stood in the relation of master."

BRITISH ACTOR PIONEERS GAS

Perhaps it is chronologically incorrect to tell of the operation of the first gas company without first outlining a bit of its history. That phase of development, too, has its romance. The miraculous new gas light of the early



Merchandising displays in the New Orleans utility's headquarters.

of Gas *in* New Orleans

Vice-President
New Orleans Public Service Inc.

MR. PATERSON, who contributes this colorful sketch of gas service since its inception in New Orleans, is vice-president of the New Orleans Public Service Inc., and chairman of the Arrangements and Entertainment Committee for the Natural Gas Department Convention being held in his city May 5, 6, 7, and 8—*Editor.*

19th century was introduced to New Orleans by a British actor, and its first use was for the lighting of a theatre.

About 1820 James H. Caldwell, one of a company of English actors, came with his troupe to New Orleans, then an embryo city of 30,000 souls, mostly Creoles. Something about New Orleans intrigued the far-sighted Caldwell, for he remained after his troupers departed. His talents were versatile if we are to judge by the many enterprises with which he eventually became affiliated. We are, however, principally interested in his building of theatres, because it was for the illumination of these places of entertainment that Caldwell sent to England for a "gas machine" to light his first new theatre, the American. Later he built another theatre, the St. Charles, and the lighting effect here far excelled anything of its kind in America at that time. The chandelier under the central dome with its 250 gas lights, and almost 25,000 cutglass drops, was a source of unending speculation and admiration to the amazed citizenry.

Just where New Orleans ranks in the order of American cities to receive gas service is a disputed claim. It is, of course, definitely known that London first manufactured gas commercially in 1812. Baltimore, Md., had it by 1816. Fourteen years later, in 1830, New York and Boston had their streets lighted by gas. It is claimed that a citizen of New Orleans had the first gas stove in the United States, imported from France, about 1850, but although this is quite probable, it is impossible of proof.

The earliest legal record filed on the gas industry in New Orleans is found in an act, passed February 7, 1829, incorporating the "New Orleans Gas Light Company." For some reason this company failed to act, and four years later, in 1833, the franchise was declared forfeited. The exclusive privilege of vending gas lights in New Orleans was then given to "New Orleans' Father of Gas Light," the venerable James H. Caldwell. Two more inactive years passed, and by 1835 we find Caldwell transferring his rights, "for a consideration," to the "New Orleans Gas Light & Banking Company." Caldwell no doubt wanted banking privileges to help finance his gas and other projects, and in those days, in order to encourage the development of industry, the State of Louisiana granted charters for banking only if accompanied by an agreement to do something further. The organization of this company was primarily for banking purposes, the manufacture and sale of gas being merely appended as an "excuse for being" for the banking interests.

A handsome wrought-iron gate marks entrance to New Orleans gas plant.

In 1835, therefore, the first gas plant in New Orleans was constructed. By August the building was complete, the mains, which were, interestingly enough, made of wood, nearly all laid, and "service for two miles was assured." Today gas service in New Orleans is rendered throughout the city, and there are 634.94 miles of cast iron and steel gas mains.

Thus has romance woven its pattern through the history of development and operation of New Orleans' first gas plant. No less interesting are some of the side-lights on early gas manufacture in New Orleans. Faced with the problem of purification, the early gasmaker turned to the abundant local oyster supply and from oyster shells secured the lime which formed an important item in the process of purifying artificial gas. As a part of the regular routine the gas company each day sent out wagons to collect discarded oyster shells from restaurants and oyster dealers.

Reproduction from an old print of Col. W. S. Campbell, engineer, New Orleans Gas Light Company, 1847-1860

The first gas plant was very simple, consisting of three benches, of three iron retorts each. The plant was enlarged in about 1850 to 16 benches of three retorts each. In 1859, 40 benches of three clay retorts each were installed, each retort being 12 by 20 inches and 8 feet 16 inches long. The hydraulic main was circular in section, 18 inches in diameter, and the benches were supplied with 4-inch stand pipes. In about 1868, there were placed in these benches five retorts, space for them being created by lowering the floor line of the retort house and setting the furnace lower down. The same hydraulic mains were adapted to this change. These benches were used until the consumption had reached 1,100,000 cubic feet per day. In about 1875 the retort house was built, and in it were installed 48 benches of six retorts each. These benches made all the gas until about 1883, when the Edgerton process for making gas was installed. This process consisted of a set of generators for producing water gas and an evaporator for vaporizing naphtha. The naphtha vapor was taken up by the water gas and carried along through heated retorts as fixing chambers.

(Continued on Page 114)

Uses *for* Liquefied Petroleum Gas *in the* Gas Industry

By F. A. HOUGH
Research Engineer
Southern Counties Gas Company

PORTIONS of Mr. Hough's discussion published in these pages were given as a report before a recent session of the Pacific Coast Gas Association Technical Section, and on March 20 the discussion was delivered in an amplified form before the Southern California Meter Association.

A few weeks ago the Southern Counties Gas Company inaugurated service through its central butane distribution plant at Moorpark, Calif. Mr. Hough, who was closely associated with the work of research and design for this plant, has added a brief description of its equipment and operation to this article. The plant is the first to be installed on the West Coast, and is one of the few in service the country over.—*Editor.*

THE petroleum gases, propane, isobutane and normal butane, are produced as a by-product during the recovery of natural gasoline from natural gas, and are available to the gas industry in immense quantities for any practical use to which they can be put.

The outstanding characteristic of these hydrocarbons is the ease with which they can be liquefied. Because of this property, it is possible to transport and store these materials as liquids in relatively light pressure containers and to use them as a gaseous fuel, the only gasifying equipment needed being a common pressure regulator. For this reason it is possible by the use of liquified petroleum gases to serve with an excellent gaseous fuel, individual consumers and communities which, because of their isolated location, cannot be economically supplied with natural or manufactured gas.

I. *Production and physical properties of commercial liquefied petroleum gases.*

The process whereby natural gasoline is obtained from natural gas consists essentially of scrubbing the wet natural gas with an oil which absorbs practically all of the propane, butane, pentane and heavier hydrocarbons, together with some methane and ethane. The oil is run from the gas scrubbers to stills, where the hydrocarbons dissolved out of the natural gas are distilled off. The vapors from the stills pass to a fractionating column in the lower levels of which the heavier natural gasoline fractions condense out. In the upper, colder levels of the tower, a portion at least of the propane and butane condenses.

This mixture of liquid propane and butane can be drawn off and, without further treatment, used under certain conditions as a source of gaseous fuel. The first liquefied petroleum gases placed on the market as domestic fuel were mixtures of propane and butane obtained in this manner.

The two analyses shown in Table No. 1 are typical of these gas mixtures:

Sample No. 1 was produced in a plant treating wet natural gas. Sample No. 2 was produced in a plant treating gas from a high pressure transmission line and operating under a pressure of 375 pounds per square inch.

When a mixture similar to sample No. 1 or No. 2 is used as a domestic fuel in an isolated home, it is stored as a liquid in a small pressure container. As gas is used, the liquid in the container boils, thus giving a supply of gas until the liquid is used up. The light fractions tend to boil off first. Under these conditions, the consumer does not get first class gas service because there is a wide fluctuation in the heating value of the gas. The first gas drawn from a full container has a comparatively low heating value and specific gravity. When the container is nearly empty, the gas obtained has a very high heating value and specific gravity.

To eliminate these fluctuations in heating value and specific gravity, most of the oil companies who are actively engaged in the marketing of liquified petroleum gases have installed the necessary additional fractionating columns, etc., required to make a sharp separation of propane and butane. They are therefore able to supply almost pure liquid propane or butane, either one of which will of course, give a gas of constant heating value. Some of the physical properties of the pure hydrocarbons are given in Table No. 2.

II. *The utilization of propane and butane as domestic fuels.*

Either propane or butane, or a mixture of the two gases, can be burned satisfactorily in any properly adjusted standard gas range. The only adjustment necessary, as a rule, to convert a range from standard ordinary fuel gases to liquefied petroleum gases is the reduction of the area of the gas orifice in the burners. When liquefied petroleum gases were first placed on the market as domestic fuels, any gas range was considered suitable for use with them. Propane retails for from 8 to 12 cents per pound in small pressure containers. The first price is equivalent to $4.20 and the latter is equivalent to $6.30 per M.c.f. of 1100 B.t.u. natural gas. At these prices, the need for obtaining the highest possible utilization efficiency is evident. This need for high efficiency has resulted in the development of special ranges, in which the top burners have been raised to within from ¾-inch to ⅝-inch from the top of the grate, and in some cases, a secondary air control plate has been placed around the burners.

The average thermal efficiency of the top burners on a standard modern gas range which is properly adjusted is about 35 per cent, when either natural gas or liquefied petroleum gases are burned. The thermal efficiency of the top burners on the special ranges developed for liquefied petroleum gases

TABLE NO. 1

	Per Cent by Volume (Gaseous State)	
	Sample 1	Sample 2
Methane and Ethane CH_4 and C_2H_6	3.70	2.20
Propane C_3H_8	27.40	48.50
Iso-butane C_4H_{10}	16.90	49.30
Normal butane C_4H_{10}	51.00	
Pentane and higher hydrocarbons	1.00	
Calculated heating value (B.t.u. per cu. ft.)	2986	2830
Calculated specific gravity (Air = 1)	1.90	1.82

ranges from 44 to 55 per cent. By increasing the top burner efficiency from 35 to 45 per cent, the quantity of gas required to perform a given cooking operation under laboratory conditions is reduced by 22.3 per cent of the gas consumption of the standard range.

It should be emphasized that these modifications in gas ranges have resulted from the high prices at which liquefied petroleum gases have been selling, rather than from any inherent difference in the gas itself. An ordinary natural gas range will burn straight liquefied petroleum gases almost as efficiently as it will burn natural gas. To obtain high efficiencies in butane ranges, it has been necessary to sacrifice some speed and, in some cases, stove manufacturers have gone to such extremes to obtain efficiency that their ranges will not operate without sooting kettles. This is the exception, however, rather than the general rule.

The use of liquefied petroleum gases in gas appliances other than ranges has as yet been rather limited, because of the high cost of operating such appliances at current liquefied gas prices. All standard gas appliances, such as water heaters, radiant fire heaters, gas-steam radiators, gas furnaces, and gas refrigerators will, with minor adjustments, operate very satisfactorily on butane.

III. *Available supply of liquefied petroleum gases.*

A supply of propane and butane is available in California which for all practical purposes is unlimited. In Table No. 3 analyses made by the fractional distillation method are given for nine wet gas samples from representative Southern California fields. The average propane content of these nine samples is 5.38 per cent. If we assume that 5 per cent is a fair average propane content for all the natural gas treated in natural gasoline plants in California, and that all of the propane could be isolated if need be, the total potential propane production can be estimated. During the month of January, 1930, approximately 57 billion cubic feet of natural gas were treated in California natural gasoline plants.

.05 × 57 billion=2.85 billion cu. ft.=estimated possible propane production for the month.

This quantity of propane is equivalent on a B.t.u. basis to 13.2 billion cu. ft. of 550 B.t.u. gas. During the year 1928, 550 B.t.u. oil gas was used exclusively in San Francisco. The total quantity of that gas manufactured during the year for that city was 9.2 billion cu. ft. Thus it is made evident that at the present time the potential propane production in California in one *(Turn to Page 70)*

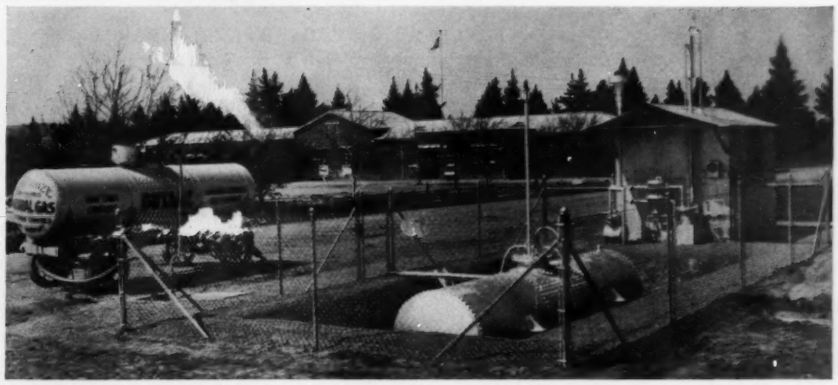


Fig. 1. Liquefied gas plant of Southern Counties Gas Company at Moorpark, Calif.; note the tank trailer used for butane transportation.

Butane Distribution at Moorpark, Calif.

TO test the feasibility of using liquefied petroleum gases as a gas supply for small isolated communities that cannot be supplied economically with either manufactured or natural gas, the Southern Counties Gas Company of California has recently installed and put into operation a plant and distribution system to supply the residents of Moorpark, Calif., with butane gas. This Moorpark installation is unique in a number of respects:

A mixture of propane and butane, having a heating value of 2830 B.t.u. per cubic foot is distributed undiluted through a standard gas distribution system.

The gas plant and distribution equipment are entirely automatic. The operator is regularly employed in Fillmore, a town on the other side of a low range of mountains, and nine miles from Moorpark. He goes to Moorpark only to make occasional inspections, read meters, take care of off and on orders, etc.

Gas is measured and billed to the consumer on a pound, rather than a cubic foot, basis.

To insure safety, the gas is odorized.

The gas company property consists of 92 services, 2.3 miles of 2- and 3-inch mains, a tank trailer, and a plant where the liquefied gases are stored and vaporized. The total investment is approximately $17,000. The installation is designed to eventually care for 200 consumers.

The gas plant and the trailer used for transporting the liquefied gases from the source of supply to the plant are shown in Fig. 1, and Fig. 2 shows the regulator set-up. Operation of the plant is as follows: Liquid flows from the tank through line (1) (See Fig. 2) to the two regulators (2) operating in parallel. These regulators reduce the liquid pressure from whatever it is in the tank (50 to 150 pounds per square inch depending upon the atmospheric temperature) to approximately 12 pounds per square inch. This reduction in pressure causes a portion of the liquid to vaporize, which in turn reduces to a very low point the temperature of the regulator and the remaining liquid. The mixture of very cold liquid and gas then passes to the heat exchanger (3), where the required latent heat of vaporization is supplied. The resulting vapors pass from the top of the heat exchanger to a regulator (4) where the gas pressure is reduced from 12 pounds to 11 inches—the pressure carried on the distribution system. The gas then passes through the station meter (5) and into the distribution system.

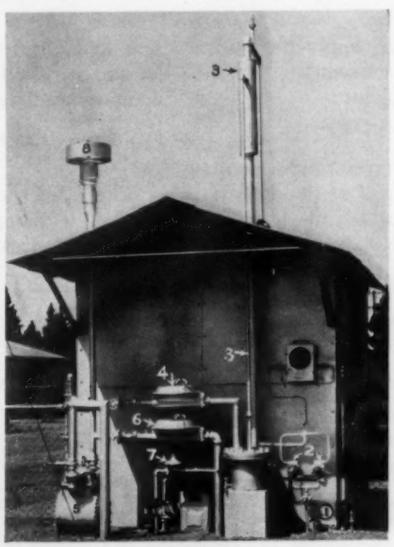


Fig. 2. Regulator set-up at Moorpark plant.

By taking liquid from the tank and vaporizing it in the manner just described, a gas of constant heating value is obtained, regardless of whether or not the material used is pure propane or butane, or a mixture of the two.

Regulators (6) and (7) are for standby purposes. If for any reason the gas supply through the main system of regulators is interrupted and the pressure in the distribution system starts to drop, regulators (6) and (7) will open up and supply gas drawn from the vapor space above the liquid. Regulator (6) is set for an outlet pressure of 9 inches of water and regulator (7) is set for an outlet pressure of 12 pounds per square inch.

A pressure relief valve (8) in the distribution system is set to flow at 15 inches water pressure.

Heat is supplied to the heat exchanger through an automatic storage water heater (located in the building) and a thermo syphon circulating system.

Leakage is an item of paramount importance when a gas of such high value per unit of volume as that used in this case is distributed. In the design and construction of the distribution system

(Cont. on Page 95)

TABLE NO. 2. PROPERTIES OF PARAFFIN HYDROCARBONS[1]

	Methane CH_4	Ethane C_2H_6	Propane C_3H_8	Butane C_4H_{10}	Isobutane C_4H_{10}	Pentane C_5H_{12}	Isopentane C_5H_{12}	Hexane C_6H_{14}
Melting point, °F.	—299.2	—277.6	—309.8	—211.0	—229.0	—204.7	—225.5	—137.7
Sp. grav. of liquid, 60°/60°F.	.....	.3779	.5090	.5845	.5647	.6312	.....	.6641
°A. P. I. of liquid	.....	242.9	146.5	110.6	119.1	92.7	.....	81.6
Lbs. per gal. of liquid at 60°F.	.....	3.141	4.234	4.864	4.699	5.253	.....	5.527
Gals. per lb. of liquid at 60°F.	.....	.3184	.2362	.2056	.2128	.1904	.....	.1809
Vapor pressure of liquid lbs. at 60°F.	.....	483	92.4	11.6	24.0	16.0*	11.6*	26.1*
Vapor pressure of liquid lbs. at 80°F.	.....	617	128.1	22.9	39.2	8.6*	1.1*	23.6*
Per sq. in. gauge at 100°F.	.....	.....	172.0	37.5	59.0	0.9	5.8	20.0*
Per sq. in. gauge at 120°F.	.....	.....	225.0	56.1	83.3	7.8	13.9	14.8*
Mean coefficient of expansion, 0°-50°F.	.....	.0028	.00143	.00096	.00113	.00081	.....	.00070
Mean coefficient of expansion, 50°-100°F.	.....	.....	.00180	.00113	.00128	.00089	.....	.00078
Boiling point, °F.	—258.5	—127.5	—44.0	+30.9	10.0	97.0	82.3	156.1
Heat of vaporization at boiling point B. t. u. per lb.	222.7	210.3	183.1	165.6	158.8	153.1	.....	143.3
B. t. u. per gal. of liquid at 60°F.	.....	660.6	775.2	805.4	746.2	804.2	.....	792.0
Critical temperature, °F.	—115.8	+90.0	207.5	272.7	307.8	387.0	370.0	454.6
Critical pressure, lbs. per sq. in.	673	708	661	533	524	485	483	435
Specific gravity of gas, air=1	.554	1.049	1.562	2.085	2.067	2.490	2.490	2.974
Density of gas, lbs. per cu. ft.	.0424	.0803	.1196	.1596	.1583	.1907	.1907	.2277
Cu. ft. of gas per lb. of liquid at 60°F.	.....	12.49	8.379	6.277	6.330	5.254	.....	4.399
Cu. ft. of gas per gal. of liquid at 60°F.	.....	39.21	35.48	30.52	29.74	27.60	.....	24.31
Specific heat of gas at constant pressure, B. t. u. per lb.	.593	.505	.473	.456	.462	.448	.448	.442
B. t. u. per cu. ft.	.0251	.0406	.0566	.0728	.0731	.0854	.....	.1006
Limits of inflammability, % of gas, Lower limit	5.3	3.2	2.4	1.9	.....	1.4	.....	.....
Limits of inflammability, % of gas, Upper limit	14.	12.5	9.5	8.5	.....	8.	.....	.....
Maximum rate of flame propagation, in 1 in. tube, ft. per sec.	2.17	2.80	2.69	2.71	.....	2.72	.....	.....
Composition at maximum rate of flame propagation, % of gas	9.96	6.53	4.71	3.66	.....	2.92	.....	.....
Cu. ft. of air to burn 1 cu. ft. of gas	9.57	16.72	23.92	31.10	31.10	38.28	38.28	45.41
B. t. u. in gas per lb. of liquid at 60°F.	.....	21882	20973	.....	20579	20948	.....	20583
B. t. u. in gas per gal. of liquid at 60°F.	.....	68695	88806	.....	96685	110041	.....	113746
B. t. u. per lb. of gas	23628	21807	20925	.....	20538	20911	21043	20549
B. t. u. per cu. ft. of gas	1003	1752	2503	.....	3251	3987	4012	4679

All weights of liquid are in air.

All gas volumes corrected to 60°F. and 30 inches of mercury, dry.

Specific gravity of gaseous pentanes and hexane, specific heats of gases, and volume of air required for combustion computed.

Limits of inflammability from U. S. Bureau of Mines Bulletin No. 279.

All other data based on figures from International Critical Tables and from paper by Dana, Jenkins, Burdick and Timm, Refrig. Eng., 12,387, (1926).

*Inches of mercury vacuum.

1. From Gas and Water Handbook, 10th Edition, compiled by Engineering and Research Dept. of the Pittsburgh Equitable Meter Co.

month is sufficient to supply the entire manufactured gas requirements for the city of San Francisco, for:

$$13.2 \div 9.2 = 1.4 \text{ years.}$$

The potential butane production is probably about one-third of the potential propane production on a B.t.u. basis. At the present rate of natural gas production in California, enough propane and butane are available to supply the entire domestic fuel requirements of the state.

IV. *Present status of liquefied petroleum gases in the California gas industry.*

There are now in progress in California a number of developments which promise to greatly increase the importance of propane and butane gases as a domestic fuel. At the present time all of the liquefied petroleum gases used for domestic fuel in California are supplied in individual pressure containers. In a short time mixtures of butane and air will be distributed in standard gas distribution systems in a number of small towns which have in the past had manufactured gas, or no gas at all. There is also a distribution system and plant under construction, which will supply a straight mixture of propane and butane to consumers through a gas distribution system.

TABLE NO. 3. REPRESENTATIVE ANALYSES OF CALIFORNIA WET NATURAL GAS

Gas Field	CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12} and up
Signal Hill	.44	75.00	9.25	7.96	4.35	3.00
Signal Hill	.53	81.77	7.86	5.27	3.07	2.09
Santa Fe Springs	.46	78.96	8.40	5.87	3.37	2.94
Santa Fe Springs	.33	80.68	8.36	4.98	3.23	2.42
Santa Fe Springs	.48	80.08	8.60	5.09	3.13	2.62
Ventura	.19	87.22	4.14	4.09	2.49	1.87
Goleta	.00	79.46	8.27	5.60	3.73	2.91
Huntington Beach	1.90	76.59	7.77	6.99	3.37	3.09
Torrance	1.11	87.04	4.13	2.56	2.00	3.42

V. *Cost of liquefied petroleum gases.*

Since an enormous supply of propane and butane is available and since these gases make a very satisfactory domestic fuel, it is obvious that the future im-

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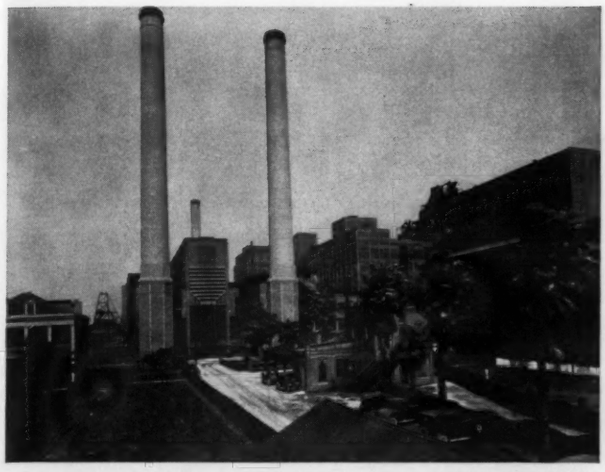
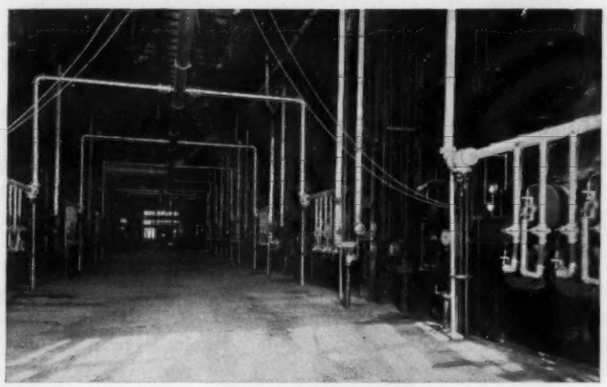




UPPER: American Sugar Refining Company, New Orleans, Louisiana.

LOWER: Boiler room at the American Sugar Refinery. Gas from the Monroe-New Orleans line is served to this large user by the Louisiana Power and Light Company.

Natural Gas in a Sugar Refinery

By CHARLES M. ROGERS

Industrial Gas Engineer, Louisiana Power and Light Company, Mississippi Power and Light Company, New Orleans Public Service Inc.

At the beginning of last year natural gas replaced the solid and liquid fuels in this plant. The boiler equipment consists of 10—450 HP and 10—566 HP boilers. The filter house has 38 bone black kilns, all fired with natural gas, 30 being fired on both ends and eight on one end only. To supply the fuel for the boiler room and char kilns requires 12 to 15 million cubic feet of natural gas daily. This is the largest single consumer on the Monroe-New Orleans gas line, with the exception of the Standard Oil Refinery at Baton Rouge and the power plant of the New Orleans Public Service.

The gas is served to the refinery by the Louisiana Power and Light Company, which company also made the installation. The boilers were formerly equipped with Combustion Frederic type underfeed stokers. These stokers were removed and stored away. The wind box openings under the stokers and the

(Continued on Page 89)

AFTER passing through and serving the city of New Orleans, the 270-mile natural gas line from north Louisiana fields terminates below the city on the battlefield of Chalmette. It was on this site, the plains of Chalmette, that the last battle of the war of 1812 was fought on January 8, 1815. Here it was that General Jackson, with the aid of the famous pirate and buccaneer, Jean Lafitte and his followers, defeated the British under General Packenham. The beautiful Packenham oaks in two sturdy rows still stand, as well as the Colonial Mansion, partially ruined, which he used for headquarters. If he could now walk out on the gallery and look toward the Father of Waters he would view the Chalmette Refinery of the American Sugar Refining Company now located on this historic site. This immense institution—one of the world's largest sugar refineries—if viewed by day, might appear inactive, because there is no smoke emitting from the large boiler house chimneys nor from the 38 furnaces in the char house, where natural gas is now burned instead of coal or fuel oil.

C. M. Rogers

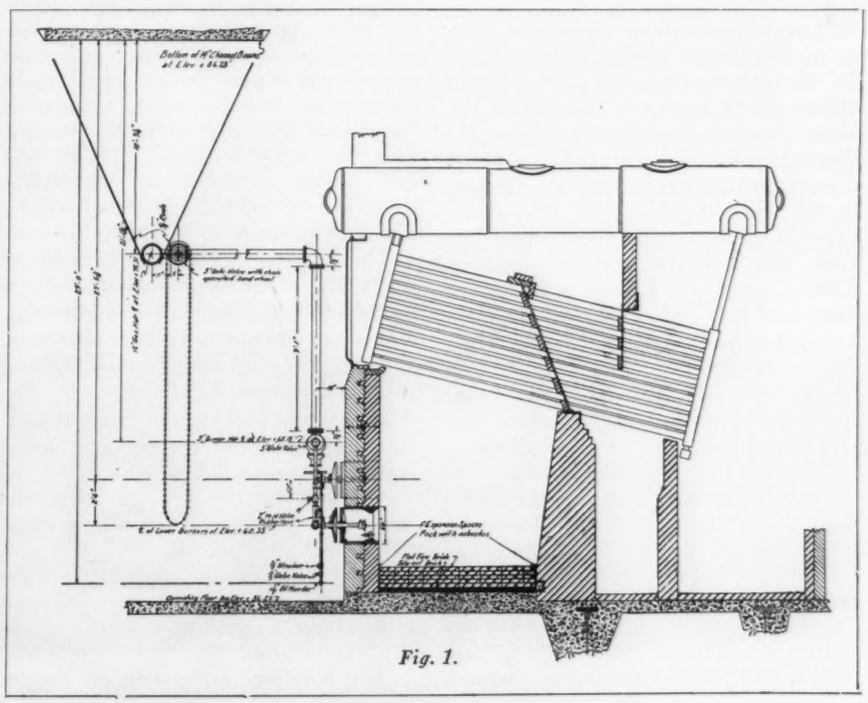
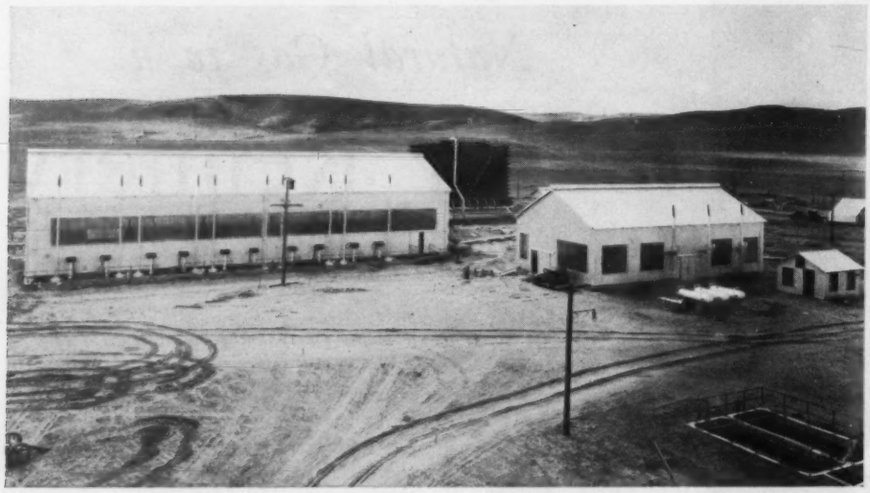


Fig. 1.



Main and auxiliary buildings, gas cooling tower, air tanks, oil house and hot well, at P. G. and E. Kettleman Hills compressor station.

A Description of the Pacific Gas and Electric Company's Kettleman Hills Compressor Station and Field Headquarters.

Designing *a* Modern Compressor Station

By FRED F. DOYLE
Manager Natural Gas Division
Pacific Gas and Electric Company

THE Pacific Gas and Electric Company of San Francisco recently completed the construction of its compressor station and buildings for its field headquarters at Kettleman Hills. Its property is located on the north slope of the hills on Section 25, Township 21S, Range 17 E, in Kings County, occupying a tract of 40 acres in the center of the section. It is at the junction of its 51-mile 16-inch pipe line from the Buttonwillow gas field in Kern County, its 16-inch and 22-inch lines extending 2¾ miles from the main producing area of the Kettleman Hills field, and the 22-inch and 26-inch main transmission lines leading to San Francisco, Oakland and the so-called Bay Region, 200 miles north of the plant.

The station embodies the best features of compressor plant design developed to date and also several other details of design planned to make it most efficient. All of the buildings are of steel frame and corrugated iron construction calculated to withstand high wind velocities which occur occasionally in that region, and are laid out in such a manner that when available gas pressures are lower and the demand for gas is greater the plant can be enlarged readily and economically.

The main compressor building is 145 feet 6 inches long by 50 feet in width, and is 23 feet 5 inches in height to the eaves, the basement floor being seven feet below the main floor. In this building there are five 760 horse power twin tandem gas engine driven, single stage compressors and an extra foundation for a sixth unit that could be installed in a short time if needed. These units are capable of delivering 70,000,000 cubic feet of natural gas a day with a discharge pressure of 400 pounds.

The electric wiring is in conduit with 300 watt vapor proof globes placed so as to illuminate the entire engine room economically and efficiently, throwing an even light on all moving parts and eliminating shadows.

In this building are two 5-ton cranes, both capable of traveling the entire length of the building, one over the power end of the machines and the other over the compressor end. A crane therefore is available for each end of a unit that is being overhauled or for the power end of one unit and the compressor end of another if such a necessity should arise.

The buildings are coated on the interior and exterior with aluminum paint, and all piping is also covered with aluminum paint. A plan has been carried out of marking all pipe lines with a band or bands of different colors designating the purpose of each. Low pressure and high pressure gas lines, air lines, oil lines, water pipes to and from the engines, etc., each have a distinct color band or a combination of bands so that the operators and repair men can readily identify any line on which they are working. The machinery is painted with a dark green engine enamel, forming a pleasing contrast with the gray paint in the building.

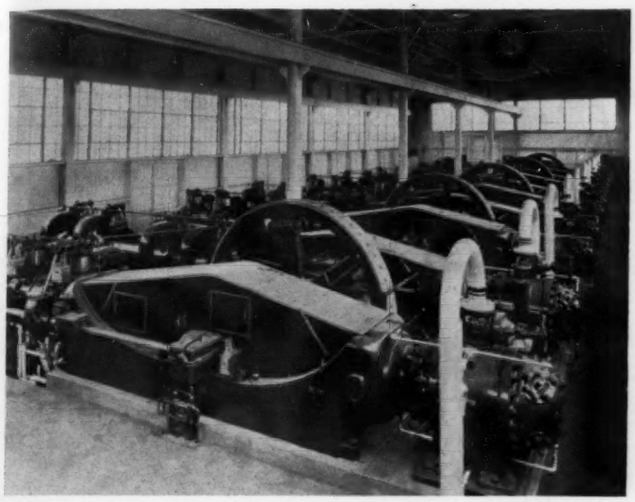
Fred F. Doyle

The engine room floors, of steel beam and concrete construction, are separated from the main engine foundations by expansion joints and are coated with a concrete floor sealer to prevent any oil or grease dropped on the floor from getting into the pores of the cement.

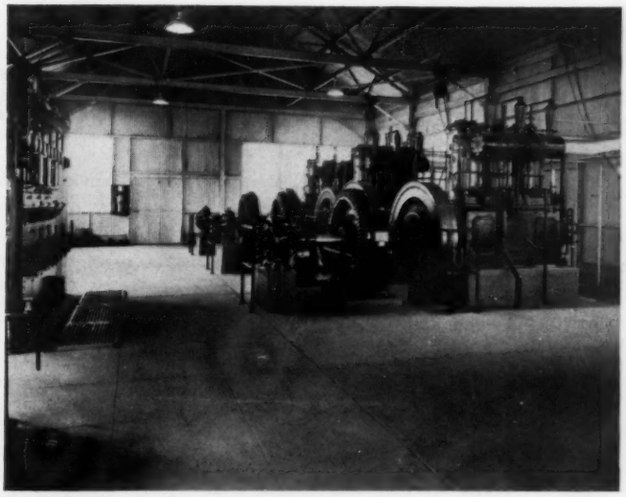
The upper half of the sides of the buildings from end to end are glazed to allow the maximum amount of daylight in the engine room. Double steel doors on tracks are located back of the ends of each unit with runways of open grating leading away from the doors over the pipe pits.

All pipe headers running parallel to the building are in pits extending the length of it, making them very accessible. These pits have concrete walls and floors and on the compressor side are wide enough for the future installation of additional intake and discharge lines, having in mind especially the time when two-staging the gas will be necessary.

As a means for keeping the main engine room cool during the warmer months, especially the floor, an open



Interior of main compressor building, Kettleman station.



Gas engine driven electric generators, in auxiliary building.

basement feature was included in the construction. An open space from the main floor down to the basement floor in each side of the building permits the free circulation of air through the basement, where the hot exhaust pipes from the gas engines are located. Air filters placed on the air intake pipes protect the interior of the engine cylinders; in case of windstorms, sand and grit are prevented from reaching the cylinders, pistons and rings, thus insuring longer life of these parts.

Although each main compressor unit has its own lubricating oil system with filter there is an oil system connected to all of the units which operates continuously, further cleaning the oil. Sufficient oil is allowed to circulate so there is an overflow from each unit. This oil runs by gravity to a dirty oil tank from which it is pumped into a centrifugal separator. The clean oil from the separator is pumped back to an overhead tank in the main building. Connected to this tank is a 2-inch header running the entire length of the building; 1-inch lines with sight feed glasses extend down from this header to both sides of each unit.

The water system for the engines and compressors is practically enclosed; the hot water runs from each unit into a 12-inch header and from it into a reenforced concrete hot well 18 feet wide, 22 feet long by 7 feet 6 inches deep, where the velocity is reduced, allowing any oil to accumulate on the surface. From the hot well it is pumped with centrifugal pumps driven by 60-horsepower motors through cooling coils placed in four banks of four coils each in series which are installed in a cooling tower; from these coils the cooled water passes back to the engines and compressors. The system is so designed that there is 35 pounds per square inch water pressure available at the engines.

The water supply of the station is contained in one 300,000-gallon steel tank for plant use and one of 30,000 gallon capacity for domestic use. A fire system with the necessary high pressure pumps was installed covering the entire property.

The hot discharge gases also pass through high pressure coils placed in six banks of two coils each in parallel in a cooling tower. Motor-driven centrifugal pumps are used to circulate water over the cooling towers.

The water which could have been obtained by drilling on the property contained such a large amount of incrusting solids it was decided to drill wells on company property located seven miles from the station where water almost scale-free and of very fine quality was obtained in two water wells drilled approximately 700 feet deep. These wells are equipped with motor driven deep-well pumps; the water flows into a concrete settling basin, from which it is again pumped through an 8-inch steel welded line to the station.

An auxiliary building 40 feet wide by 72 feet in length is located 50 feet from the main compressor building. In it are housed three 200-horse power vertical gas engines, each direct connected to a 175 K.W., 440 volt, three phase, 60 cycle A. C. generator. These units supply electrical energy for the motor driven pumps, air compressor, machine tools and current for the lighting circuits in the plants and grounds. All plant motors operate on 440 volts, but the lighting circuits are stepped down to 110 volts. The following apparatus is also located in this building:

Motor-generator set for charging storage batteries used for the gas engine ignition.

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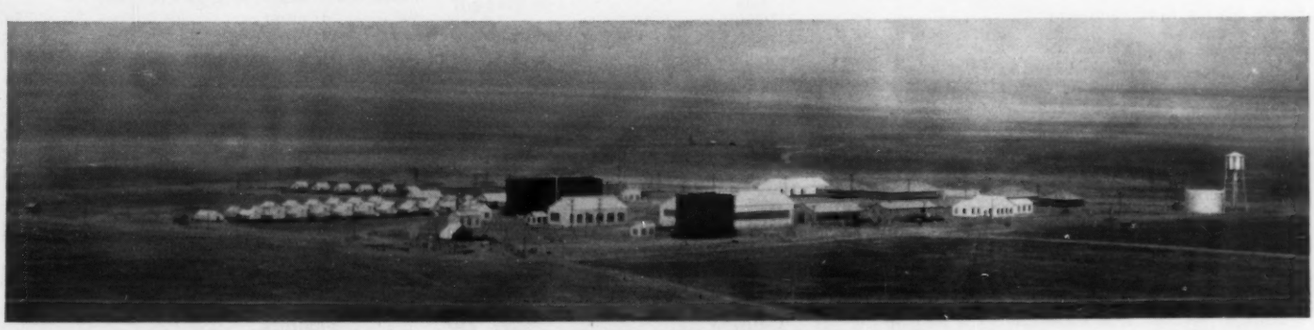


General view of P. G. and E. compressor station and field headquarters at Kettleman Hills.

New Gas Markets in the West

IN PRACTICALLY all of the 22 Western states and the western provinces of Canada new gas territory is reported for 1929 and 1930. The following list of "new gas towns" is compiled from information furnished *Western Gas* by individual gas companies serving the West. Three classes of new gas communities are given, under the heads: "Service Begun 1929," "Service Begun 1930," and "Franchises granted; Service Not Yet Begun."

Service Begun 1929

Company	Town	Population
ARIZONA		
Central Arizona Light & Power Co.		
	Tempe	2,000
ARKANSAS		
Arkansas Natural Gas Corp.		
	Stuttgart	4,522
	Nashville	2,144
	Washington	600
	Little Rock	127,000
	Mineral Springs	777
	Fordyce	2,996
	Bearden	687
	Russellville	4,500
	Atkins	1,600
	Morrillton	4,500
	Plummerville	750
	Pottsville	500
Arkansas Power & Light Co.		
	Lake Village	2,500
	Eudora	1,000
	Dermott	3,000
	McGhee	5,000
	Wilmot	800
CALIFORNIA		
Pacific Gas and Electric Company		
	Alviso	700
	Benicia	2,850
	Belvedere	750
	Cupertino	150
	Centerville	1,200
	Decoto	300
	Irvington	1,000
	Los Altos	500
	Milpitas	300
	Mt. Eden	200
	Niles	1,000
	Newark	500
	Saratoga	500
	Tiburon	400
Santa Maria Gas Company		
	Lompoc	4,000
	Santa Margarita	200
	Garden Farms	100
	Atascadero	3,000
	Templeton	600
	Paso Robles	5,000
Southern California Gas Company		
	Lemoore	
	Armona	
Southern Counties Gas ompany		
	San Juan Capistrano	1,200
	San Clemente	1,400
COLORADO		
Durango Natural Gas Company		
	Durango	7,000
Public Service Co. of Colo.		
	Englewood	6,400
	Littleton	2,000
	Edgewater	2,000
	Mountain View	700
	Arvada	4,000
	Berthoud	1,000
Public Utilities Consolidated Corp.		
	Swink	
	Rockyford	
	Las Animas	
	Fort Lyons	
	La Junta	
KANSAS		
Argus Gas & Fuel Co.		
	Dodge City	11,000
	Elkhart	1,500
	Hugoton	1,200
	Moscow	250
	Satanta	400
	Sublette	750
	Copeland	250
	Ensign	250
	Cimarron	1,100
	Plains	1,000
	Meade	1,600
	Fowler	1,000
	Rolla	300
	Montezuma	450
Central Kansas Gas Co.		
	Hays	
Consolidated Gas Utilities Co.		
	Wichita	115,000
Kansas Pipe Line & Gas Company		
	Great Bend	5,406
	Hoisington	2,909
	Ellinwood	1,093
	Bison	303
	La Crosse	1,128
	Otis	411
	Olmitz	160
	Walker	100
	Victoria	440
	Gorham	150
	Russell	2,310
	Timken	150
	Larned	3,182
	Lewis	313
	Loretto	20
	Kinsley	1,986
	Assaria	230
	Ogden	367
	Mentor	25
	*Canton	900
	*Galva	350
	*Inman	482
	*Buhler	486
	*Moundridge	753
	*Belleville	2,271
	*Clyde	1,207
	*Washington	1,419
	*Hanover	947
	*Marysville	3,946
	*Blue Rapids	1,570
	*Waterville	665
	*Irving	341

*Piping completed but not served.

KANSAS		
Public Service Company of Kansas		
	Ashland	1,400
	Protection	1,200
	Coldwater	1,300
	Haviland	800
	Cullison	250
	Pratt	6,000
Gas Service Company		
	Hutchinson	
	Sabetha	Horton
	Reserve	Everest
	Morrill	Atchison
	Hamlin	Hiawatha
Strong City Gas Company		
	Strong City	1,000
Winchester Oil & Gas Company		
	Hardtner	500
	Medicine Lodge	2,000
MISSOURI		
Lee's Summit Gas Company		
	Lee's Summit	2,640
Gas Service Company		
	Springfield	
	Monett	
	Neosho	
	Pierce City	
	Republic	
	Billings	
	Marionville	
	Aurora	
Missouri Natural Gas Co.		
	Poplar Bluff	
	Fredericktown	
	Crystal City	
	Farmington	
	Festus	
MONTANA		
Big Horn Oil & Gas Development Co.		
	Hardin	1,500
Pondera Utilities Co.		
	Valier	
	Choteau	
NEBRASKA		
Gas Service Company		
	Falls City	
NEW MEXICO		
Gas Company of New Mexico		
	Clovis	5,000
	Portales	1,500
	Texaco	
OKLAHOMA		
Community Natural Gas Company		
	Manitou	750
	Maysville	1,250
	Mountain Park	800
	Snyder	1,800
Consolidated Gas Utilities Co.		
	Butler	332
	Drummond	292
	Hammon	440
Kingfisher County Gas Co.		
	Hennessey	1,665
	Dover	
	Kingfisher	2,447
Public Service Corporation of Texas		
	Shattuck	
	Gage	

Standard Gas Company
- Madill 2,200
- Tishomingo 1,600

Winchester Oil & Gas Company
- Alva 5,000
- Avard 200
- Cherokee 3,500
- Mooreland 600
- Quinlan 250
- Waynoka 3,000
- Woodward 6,000

OREGON

*Portland Gas & Coke Co.
- Woodburn 3,000
- Tualatin 400
- Wilsonville 300
- Aurora 400
- Hubbard 600
- Salem 27,500

*Serves manufactured gas only.

TEXAS

Consumers Natural Gas & Power Co.
- Lohn

Community Natural Gas Company
- Athens 4,500
- Bagwell 400
- Barry 350
- Chico 1,000
- Clarksville 4,000
- Chilton 600
- Clifton 1,800
- Crandall 750
- Detroit 1,200
- Glen Rose 1,000
- Gordon 650
- Grandbury 2,000
- Grapevine 1,500
- Groesbeck 3,500
- Hamilton 3,000
- Howe 800
- Kemp 1,500
- Kerens 1,800
- Lindsay 140
- Lott 1,200
- Mabank 1,500
- Malakoff 1,200
- Meridian 1,500
- Morgan 750
- Muenster 450
- Myra 375
- Osceola 200
- Powell 500
- Ravenna 550
- Rosebud 2,000
- Saint Jo 1,400
- Seagoville 650
- Valley Mills 1,000
- Walnut Springs 1,600
- Whitney 1,400
- Wylie 1,200
- Strawn 3,000

El Paso Natural Gas Company
- Clint 1,500
- Fabens 3,300
- Ysleta 3,500

Southern Cities Distributing Company
- Pittsburg 2,540
- Mt. Pleasant 4,099
- Mt. Vernon 1,212
- Gilmer 2,268
- Winnsboro 2,184
- Jefferson 2,550
- Avinger 600
- Daingerfield 843

Texas Natural Gas Utilities
- Angleton 1,043
- Danbury 500
- Gulf 1,500
- Louise 300
- Matagorda 1,333
- Beasley 350

United Gas Company
- Lufkin 9,000
- Sour Lake 3,500
- Liberty 2,500
- Humble 2,500
- Dayton 2,500
- Highlands 600
- Crosby 1,000
- Poth 300
- Runge 900
- Falls City 300
- Floresville 1,500
- Karnes City 1,000
- Kenedy 1,700
- Yorktown 1,700
- Nordheim 500
- San Marcos 5,000

West Texas Gas Company
- Hereford
- Happy
- Tulia
- Kress
- Hale Center
- Plainview
- Lockney
- Floydada
- Abernathy
- Lubbock
- Idalou
- Lorenzo
- Ralls
- Crosbyton
- Slaton
- Southland
- Post
- Wilson
- Tahoka
- O'Donnell
- Lamesa
- Stanton
- Midland
- Odessa

Gas Company of New Mexico
- Farwell 500

Public Service Corporation of Texas
- Mobeetie
- Laketon
- Canadian
- Higgins
- Perryton
- Glazier
- Miami
- Spearman

Southern Union Gas Company of Texas
- Pecos 2,500
- Pyotte
- Wink
- Monahans 200
- Barstow 687
- McCamey
- Hico 1,638
- Waller 500
- Hempstead 2,500
- Belleview 782

WASHINGTON

Northwestern Natural Gas Company
- Grandview 1,800
- Prosser 2,000
- Sunnyside 3,000

UTAH

Wasatch Gas Co. 1,500
- Layton 1,500
- Kaysville 1,750
- Farmington 1,500
- Bountiful 2,800
- Centerville 600
- Murray 5,000
- Sandy 1,450
- Midvale 2,500

Service Begun 1930

Company	Town	Population

ARKANSAS

Arkansas Natural Gas Corporation
- Monticello 2,378
- Warren 2,145

Arkansas Power & Light Co.
- Jonesboro 15,000
- Newport 5,000
- Tuckerman 1,178
- Walnut Ridge 4,000
- Searcy 5,000
- Kensett 1,000
- Hoxie 2,000
- Batesville 6,000
- Swifton 1,000

Arkansas Western Gas Co.
- Fayetteville 5,632
- Rogers 4,000
- Springdale 2,000
- Bentonville 3,500
- Siloam Springs 4,000
- Gentry 1,150
- Elkins
- Lowell

Southwestern States Gas Company
- Greenwood 1,200

CALIFORNIA

Coast Counties Gas & Electric Co.
- Avenal 200
- Bay Point 1,500
- San Martin 100
- San Juan 650
- Aromas 100
- Tres Pinos 100
- Morgan Hill 1,000

Pacific Gas and Electric Company
- Carmel 2,000
- Livermore 2,800
- Pleasanton 1,400
- Easton

San Diego Consolidated Gas & Electric Company
- *El Cajon 3,200

*Manufactured Gas.

Southern California Gas Company
- Palm Springs
- Corcoran

Southern Counties Gas Company of California
- Moorpark 500

KANSAS

Central Kansas Gas Company
- Hays 5,350

Kansas Pipe Line & Gas Company
- Garfield 368
- Pfeifer 75
- Clay Center 4,315
- Clifton 631
- Gypsum 732

NEW MEXICO

So. Union Gas Co.
- Farmington
- Las Vegas

OKLAHOMA

Community Natural Gas Company
- Caddo 1,500

Public Service Corporation of Texas
- Fargo
- Supply

Pioneer Gas Utilities Company
Nacoma Park
Spencer
Jones
Choctaw City
Harrah
McCloud
Nichols Hills

OREGON

Portland Gas & Coke Company
*Woodburn 3,000
*Gervais 400
*Brooks 200
*Manufactured Gas.

TEXAS

Consumers Natural Gas & Power Co.
Bigspring

Community Natural Gas Company
Allen 750
Blossom 1,200
Buffalo Gap 500
Enloe 450
Iredell 750
Lawn 650
Melissa 500
Ovalo 400
Pecan Gap 500
Scurry 500
Streetman 800
Tehuacana 750
Tuscola 500

Southern Union Gas Company of Texas
Columbus 3,191
Eagle Lake 2,100
Sealy 2,000
Navisota 5,000

West Texas Gas Company
Turkey
Silverton
Quitaque
Sudan
Bowes
Shallowater
Roundup
Yellow
Littlefield
Levelland
Amherst
Sudan
Muleshoe
James
Hurley
Brownfield
Lahey
Wellman
Seagraves

UTAH

Wasatch Gas Company
Magna 3,500
Morgan 1,000

WASHINGTON

Northwestern Natural Gas Company
Mabton 1,000
Franchises Granted

Franchises Granted

(Service Not Yet Begun)

Company Town Population

ARKANSAS

Arkansas Natural Gas Corporation
Wilmar 600

Cherokee Public Service Co.
Blytheville

Public Utilities Consolidated Corporation
De Queen
Ashdown
Mineral Springs
Russellville
Dardanelle
Nashville

CALIFORNIA

Coast Counties Gas & Electric Co.
Los Banos 2,000
Gustine 1,000
Walnut Creek
Danville
Baypoint
Alamo
San Ramon
Osage
Los Medanos
Oakley
Brentwood
Byron

Southern California Gas Company
Livingston
Corcoran
Atwater
Delano
Madera County
Merced County

Southern Counties Gas Company
San Diego County Franchise

CANADA

Montana Utilities Corp.
Regina, Saskatchewan
Moosejaw, Saskatchewan

COLORADO

Fulton Petroleum Co.
Grand Junction

Public Service Company of Colorado
Loveland 6,500
Johnstown 600

IDAHO

Western Public Service Corp.
Franklin
Preston

IOWA

Peoples Gas and Electric Company
Clear Lake (Renewal) 2,900

KANSAS

Argus Gas & Fuel Company
Spearville 600

Gas Service Company
Lyons
Smith Center
Lebabob
Mankato
Formoso
Cawker
Osborne
Downs
Glen Elder
Beloit
Luray
Lucas
Ellsworth
Kanopolis
Barnard

Kansas Pipe Line & Gas Company
Seneca 1,931
Frankfort 1,330
Beattie 452
Axtell 617

Strong City Gas Company
Florence 1,700

LOUISIANA

Southern Cities Distributing Co.
Dubach 625
Bernice 625

Missouri Natural Gas Co.
De Soto
Flat River
Bonne Terre
Desloge

MISSOURI

Empire Gas & Electric Co.
Republic

John J. Ward and W. D. McGee
Piedmont

Shippey, Madden and Parish
Blue Springs

Industrial Gas Company
Kansas City (Industrial)

MONTANA

Citizens Gas Company
Bozeman

Drumheller Company
Cut Bank

Frank Conley
Deer Lodge

Montana-Dakota Power Company
Ismay
Hinsdale
Sidney

NEBRASKA

Iowa Nebraska Light & Power Co.
Aurora 2,962
Exeter 910
Fairmont 785

Gas Service Co.
Superior

Nebraska Natural Gas Co.
Crete
Wilbur
Blue Springs
Ashland
Wahoo
Wood River
Shelton
Gibbon
Sutton
Harvard
Clay Center
Edgar
Deshler
Hebron

NEW MEXICO

Southern Union Gas Co.
Santa Fe
Albuquerque
Las Vegas

Gas Company of New Mexico
Tucunicari
Lovington
Texaco

NEVADA

R. F. Crittenden and Robert E. Moody
Las Vegas

TEXAS

Northwest Texas Gas Co.
Coalgate

Texas Natural Gas Utilities
Palacios 2,000

(Continued on Page 114)

Upward Goes *the* Sales Curve

1929 Witnesses 50 Per Cent Gain in Gas Appliance Sales of Western Companies

By GEORGE H. FINLEY
Managing Editor
WESTERN GAS

MEASURED by almost any standard, 1929 was an exceptionally good year for gas company new business departments. General business recession during the latter part of the year had no counterpart in gas appliance sales activity as conducted in western United States and Canada, and the end of the year arrived with merchandise sales totals outdistancing those of 1928 in every major appliance classification—and by margins which will astound the most optimistic among sales executives. At least a 50 per cent gain in dollars of merchandise sold was recorded over 1928 by gas company merchandising departments in western America.

These statements are definite, and startling, but they are well founded. Shortly after the first of the year *Western Gas* began a survey of merchandising activity in its circulation territory, covering the 22 western states and western Canada. Through the hearty cooperation of company managements and sales executives an exceedingly significant result has been reached. This survey is presented as part of the current issue, in the form of tables giving 1929 sales totals compared with those of 1928, and also setting forth sales quotas which are guiding leading companies in their 1930 programs.

Approximately 100 gas utilities or gas departments participated in the survey, totals of several companies being lumped under the head of operating organizations in a few instances. The number of communities served by companies submitting their totals would run to many hundreds, making the survey comprehensive of the bulk of gas company appliance selling done in the section covered.

Summing up the "Appliance Sales (in Dollars)" column of the tabulations published in these pages, it developes that $15,052,374 is reported for 1929, and $8,336,225 for 1928—slightly more than an 80 per cent increase, if these figures were accepted at their face value. However, since several companies' totals for 1928 are omitted it is necessary to correct the 1928 total before a true comparison can be made and a fair percentage of increase for 1929 secured. Using the 1929 figures supplied by companies for which 1928 totals are not available, and cutting them by 10 per cent to allow for a normal gain in 1929, it then appears that a close figure for total 1928 sales of all companies reporting 1929 sales would be $10,000,000. Using this corrected total, it is apparent that 1929 sales still increased more than $5,000,000 over those of 1928. Thus the western industry may lay fair claim to a 50 per cent increase in "dollars merchandise sold"—a record to be envied, and one which attests the tremendously increased amount of sales effort gas companies are expending in the western territory.

The $15,052,374 figure, representing 1929 sales of companies reporting, should be expanded to some degree to cover several companies from which it was impossible to secure information. Dealer sales are of course not included in the survey nor in any estimates made for 1930.

On this page are given totals for the company reports on individual appliances, as well as for dollar sales. The detailed story of sales work over the past two years, and of sales goals for the current year, is carried in the tabluations appearing in the following pages, where returns of individual companies are set down.

One interesting index of the stimulus which natural gas is contributing to merchandise sales is seen in the number of companies from natural gas territory which began service in 1928 or 1929, and hence have no figures to submit for 1928.

Appliances listed in the tables on pages 78, 79, and 80, are those sold by a majority of all companies, with the possible exception of furnace conversions. In this connection, however, it is significant to note that the 1929 furnace conversion total exceeds that for 1928 by more than 100 per cent, indicating that this load is decidedly on the upgrade, and is being figured into the sales programs of an increasing number of companies.

Gas refrigerators represent another of the newer appliances which have proved out as load-builders and are finding favor with company sales departments. Table No. 1 (See Page 83) lists many of the western companies actively promoting the refrigeration load by direct sales. Refrigerator sales to the number of 2,907 are shown in 1929 for this group of companies. Many of those registering sales in 1929 show none for 1928, indicating that their refrigerator selling began last year. For 1928 the group total is only 532. Quotas for 1930 make an interesting picture in refrigeration future — 4,206 for the same companies which mustered only 532 two years ago.

APPLIANCE SALES TOTALS FOR 100 WESTERN GAS COMPANIES*

	Sold 1929	*Sold 1928*
Ranges	54,265	39,175
Hot plates and laundry stoves	6,927	5,413
Water heaters	32,857	19,350
Space heaters	52,027	30,125
Furnaces	7,385	3,861
Furnace conversions	16,884	5,679
Total gas appliance sales	$15,052,374	$8,336,225

*These figures are totals taken from detailed information submitted to *Western Gas* by approximately 100 gas companies operating in the 22 western states and western Canada. Individual totals for the various companies appear in the tabulations on following pages. Since 1928 returns in a few cases are omitted, the totals here given are not to be used for establishing exact percentage gains of 1929 over 1928.

GAS APPLIANCE MERCHANDISING REVIEW

Covering Sales and Quotas of Western Utilities

1929 Sales **1928 Sales** **1930 Quotas**

COMPANY	RANGES			HOT PLATES AND LAUNDRY STOVES			WATER HEATERS			SPACE HEATERS			FURNACES			FURNACE CONVERSIONS			NUMBER METERS 1-1-30	NUMBER SALES-MEN 1-1-30	TOTAL APPLIANCE SALES (In Dollars)		
	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930			1929	1928	Quota 1930
ARIZONA																							
Arizona Edison Co.	496		500				153		160	400		450	2						6,509	11	64,732		71,900
Central Arizona Light & Power Co., Phoenix	614	750	750	370	329	400	235	91	300	63	184	200							12,530	7	72,754	78,432	100,000
The Tucson Gas, Electric Light & Power Co.	290	196	225	82	45	50	108	120	140	29	*	*	17	*	*				5,707	4	15,000	6,418	12,000
ARKANSAS																							
Little Rock Gas & Fuel Co.**	624						128			1,061			24			21			20,600	12	123,194		
CALIFORNIA																							
Coast Counties Gas & Electric Co.	927		1,200	62		100	480		700	†	†	†	†	†	150				16,000	16	128,000		147,000
Inland Empire Gas Co., El Centro	187	114	250	134	82	175	200	100	200	192	97	250	4	1	10				1,765	1	24,836	14,487	35,000
Madera Gas Co.	68	52		4	22		36	27		8	20								695	1	9,784	8,884	
Pacific Gas & Electric Co.							2,669	2,840	1,785	4,354	3,860	4,050	968	1,594	1,000			10,475	441,983	94	1,013,971	675,493	1,500,000
Santa Maria Gas Co.																			7,300	3	70,000		
Southern California Gas Co.	2,339††	2,258‡	2,600	111††	251‡	150	1,387	702	2,000	1,480	974	1,750	526	302	650				214,065	29	524,797	333,520	600,000‡‡
Southern Counties Gas Co.	2,919	3,776	4,000	49	25	65	1,867	1,552	2,170	3,283	2,956	4,000	363	169	600				137,529	36	817,391	689,311	932,000
Turlock Gas Co.	34	33		2	5		34	29		19	29								906	1	10,532	12,094	
Valley Electrical Supply Co.[1]	15									25													
CANADA																							
B. C. Electric Power & Gas Co., Ltd., Vancouver	1,283	1,223	1,321	682	650	802	528	498	685	1,137	1,166	1,300	75	50	90				42,000	14	218,112	202,156	270,000
Victoria Gas Co. (British Columbia)	140	151	147	126	128	132	70	44	73	98	98	102	11	1	14				4,307	3	17,667	17,050	18,550
COLORADO																							
Canon City Gas Co.	22		50	3		25	12		50	6						21			641	1	3,000		
Durango Natural Gas Co.	52			13			54			44			28			40			176	1	22,205		
Public Service Co. of Colorado, Denver	1,671	2,292		388	696		3,261	2,091	5,000	1,409	1,179	†††	1,024	373	†††	3,019	2,088	†††	83,138	41	1,391,231	961,698	1,362,900
The Pueblo Gas & Fuel Co.	689	286	400	60	50		760	286	500	756	406	300	162	65	100	209	303	150	4,770	13	267,605	153,063	139,000

* 39 Space heater and furnace installations in 1928. Quota for 1930 house heating installations, 45.

** Appliance Sales were begun July 1, 1929; totals cover 6 months operation only.

† 75 Space heater and furnace installations in 1929.

†† Excluding Hotel and Restaurant Sales.

††† 1930 quota for space heaters, furnaces and furnace conversions combined, 4900.

‡‡ Excluding San Joaquin Valley Division.

[1] Subsidiary of San Joaquin Light & Power Corp.; Bakersfield, Calif.

‡ Including Hotel and Restaurant Sales.

COMPANY	RANGES			HOT PLATES AND LAUNDRY STOVES			WATER HEATERS			SPACE HEATERS			FURNACES			FURNACE CONVERSIONS			NUMBER METERS 1-1-30	NUMBER SALES-MEN 1-1-30	TOTAL APPLIANCE SALES (In Dollars)		
	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930			1929	1928	Quota 1930
IOWA																							
Cedar Rapids Gas Co.	437	388		159	160		454	464		34	50		13	12					14,207	5	74,248	69,775	
Council Bluffs Gas Co.	415		450	65		100	162		250	34		150							8,416	3	42,947		50,000
Creston Gas & Electric Co.																			1,224	1	13,700	6,500	
Des Moines Gas Co.	1,221	999	1,200	191	272	200	611	518	700	205	235	200	37	8	75				32,867		176,473	119,943	181,000
Iowa City Light & Power Co.	159	149	175	39	58	40	85	104	100	1	2	2							3,711	2	52,587	45,716	
Peoples Gas & Electric Co., Mason City	183	150	200	79	76	80	20	70	50	11	7	15	1	1	10		1	10	4,625	5	19,626	19,616	20,000
KANSAS																							
Argus Gas & Fuel Co., Dodge City																300			530*	3			
The Capital Gas & Electric Co.††	1,103	1,134	1,200	94	75	100	384	288	500	846	691	1,000	230	64	300	562	459	700	15,245	17	353,838	230,552	400,000
Central Kansas Gas Co., Hays	10		15	30		12	8		21	25		33				77		31	140**				
The Kansas Pipe Line & Gas Co.	711		900	218		300	335		650	842		750	1,252		1,300	†		†	8,862	12	281,186		305,000
Newton Gas Co.	167	149	160	4	11	10	54	20	75	235	187	225	17	18	25	71	94	100	2,600	5			
Peoples Utilities Kansas Corp., Lawrence	89	122		11	18		8	13		104	111		19	22		50	11		4,211	2	32,567	26,791	40,000
Strong City Gas Co.	8			3												25			210	1	1,100		
Kansas Pipe Line & Gas Co. (For Western Gas Co. System, purchased in 1929.)	243			78			209			54			5								62,576		
LOUISIANA																							
Baton Rouge Electric Co.	277	326	350	21	12	25	213	120	275	1,360	1,513	1,350	51	30	62	2	5	10	4,710	2	70,924	67,763	84,304
Louisiana Public Utilities, Mansfield	6		10	1		2			5	12		15							982	1	978	2,119	1,500
New Orleans Public Service, Inc.	2,844	2,829	3,500	356	276	400	681	474	1,000	3,015	1,979	4,000							73,046	20	255,733	232,450	300,000
MINNESOTA																							
Duluth Water & Light Department	199	218		59	68		54	60		54	74								22,258		20,948	21,858	
Minneapolis Gas Light Co.	3,200	1,500	3,600	290	79	400	3,050	265	4,000	300	250	400	240	80	500				123,000	40	780,000	265,000	850,000
Minnesota Northern Power Co.‡	1,151		700	665		350	904		600	2,126		1,250	225		200	1,226		450	5,793	10	495,046	276,286	400,000
MISSOURI																							
The Gas Service Co.‡‡	11,649	10,829		367	270		5,002	2,115		12,083 ‡‡‡	8,135 ‡‡‡		1,439	560		10,173	22,270		220,000 †††	211	4,236,081	2,121,286	
Lee's Summit Gas Co.	145			26			117			170						145			261				
Missouri Edison Co., Louisiana, Missouri	11	75		3	3					25	15		1			1					23,817	16,527	25,000
The St. Louis County Gas Co.	459	415	500	185	195	200	515	458	900	51	46	60	168	152	200	7			36,977	11	89,650	75,207	127,500

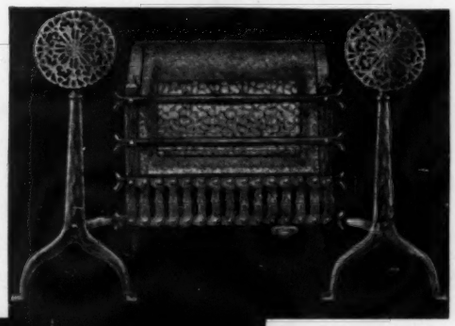
* Total meters, April, 1930—962.
** Company began operation October 20, 1929.
† Included in "furnace" totals.
†† Also included in totals under Gas Service Co
††† Approximate number reached by new business organizations.
‡ Totals given for Black Hills Utilities Co. and Montana-Dakota Power Co., combined.
‡‡ Gas Service Co. totals include those of the following companies; Wichita Gas Company, Wichita, Kansas; Wyandotte County Gas Company, Kansas City, Kansas; Arkansas Valley Gas Company, Arkansas City, Kansas; Union Public Service Company (including Ottawa, Kansas; Parsons, Kansas; and Nowata, Oklahoma divisions); Capital Gas & Electric Company, Topeka, Kansas; Hutchinson Gas Company, Hutchinson, Kansas; Newton Gas Company, Newton, Kansas; Joplin Gas Company, Joplin, Mo.;Kansas City Gas Company, Kansas City, Mo.; St. Joseph Gas Company, St. Joseph, Mo.; Western Distributing Company (including El Dorado and Augusta, Kansas divisions); Jackson County Light, Heat & Power Co., Independence, Mo.; Bartlesville Gas & Electric Co., Bartlesville, Okla.; Consumers Gas Company, Miami, Okla.; Carthage Gas Company, Carthage, Mo.; Webb City & Carterville Gas Co., Webb City, Mo.; Ozark Distributing Company, Neosho, Mo.; and other smaller companies of The Gas Service Co. group.
‡‡‡ Space heater 1929 total includes 5,521 large capacity enclosed type space heaters; 1928 space heater total includes 2,801 large capacity enclosed type space heaters.

COMPANY	RANGES			HOT PLATES AND LAUNDRY STOVES			WATER HEATERS			SPACE HEATERS			FURNACES			FURNACE CONVERSIONS			NUMBER METERS 1-1-30	NUMBER SALES-MEN 1-1-30	TOTAL APPLIANCE SALES (In Dollars)		
	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930	Sold 1929	Sold 1928	Quota 1930			1929	1928	Quota 1930
MONTANA																							
Big Horn Oil & Gas Development Co., Hardin	10			10			20			31			5			57			127	2	10,543		
Great Falls Gas Co.	516	390	500	48	97	30	407	371	410	504	522	500	101	53	120	193	402	330	4,562	4	169,767	116,542	159,000
Great Northern Utilities Co., Shelby	8	32	12				3	3	8	22	18	27							344		1,670	1,939	3,205
The Montana Power Co. (Helena Division)	17	25		5	10		20	22		1	4			1					1,821	3	5,638	8,178	
The Montana Power Co.	21			24															1,828	3	3,670	5,259	
NEBRASKA																							
Iowa-Nebraska Light & Power Co.	561	713	601	181	162	187	263	428	463	76	78	40							15,000	7	68,139	74,042	74,999
Metropolitan Utilities District, Omaha	803	948*	1,000	227	*	250	464	490	600	130	114	130	96	85	150				50,079	8	204,000	155,000	250,000
NEVADA																							
Sierra Pacific Power Co., Reno	102	85	125	69	61	75	108	106	125	5	14	25							2,908	1	13,961	12,818	15,000
OREGON																							
Portland Gas & Coke Co.	1,613	1,375	1,525	207	277	220	1,478	1,288	1,465	725	661	750	157	123	163				102,191	36	478,343	428,182	525,000
Southern Oregon Gas Corp.	111		150	85		100	161		175	171		175	1		5				1,302	2	37,061	13,700**	50,000
Eastern Oregon Light & Power Co., Baker, Oregon	7	12		12	11		13	12		5	20								363				
SOUTH DAKOTA																							
Northwestern Public Service Co.	467	440	575	148	163		226	216	306	19	22		23	2	79	†	†	†	8,586	5	55,103	43,574	75,285
TEXAS																							
Community Natural Gas Co.‡	800	900	1,100	50	50	75	600	700	800	3,000	2,000	4,000	8	5	15	60	40	75	65,000	30	300,000	300,000	400,000
Municipal Gas Co.	271	33	300	10		10	262	65	300	1,054	710	1,200	1						36,799		68,106	7,319	100,000
Southwest Gas Co., Lockhart		900			100			120			1,200			40					7,400		20,000	55,000	
Texas Cities Gas Co.	2,140		2,400				821		1,100	4,643		5,000	35		60	295		500	37,533	30	513,612		550,000
Texas Border Gas Co., Laredo (Subsidiary of United Gas Co.)	116		150	9		15	6		20	175		200								1	11,888		16,000
United Gas Co.	6,371			147			967			4,784			6			217			86,308	26	776,760		
West Texas Utilities Co.	49	91	50							254	287	250							7,960		6,899	7,765	6,500
WASHINGTON																							
Puget Sound Power & Light Co.	149	108		22	22		40	51		15	32			3					3,469	2	17,244	22,529	
Seattle Lighting Co.	2,383	2,347	2,500	537	563	650	1,606	1,675	1,350	206	137	250	34	40	250				60,534	33	259,776	255,073	
Spokane Gas & Fuel Co.	392	356	500	55	40	100	316	450	600	60	36	200	4	7	25				8,609	7	76,884	78,710	87,200
WYOMING																							
Laramie Gas Co.	110		200	22		40	47		60	45		50							262	1			
Thermopolis Gas Co.	10	6	25	5	1	20	8	4	15	15	6	25	4		15	12	6	20	400	2	6,000	600	20,000
Cheyenne Light, Fuel & Power Co.	181			24			173			136			8			101			2,473	3	68,474		

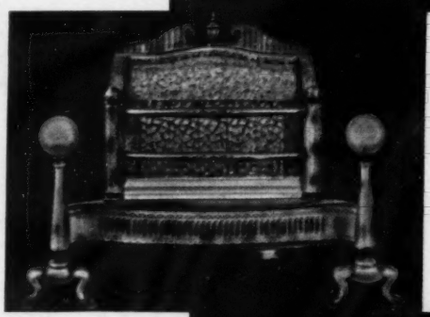
*Hot plates and laundry stoves included in "ranges" total.
**Company operated only seven months in 1928.
†Included under "furnace" totals.
‡Approximate totals.

Guardian's *Cordeveaux Finish*

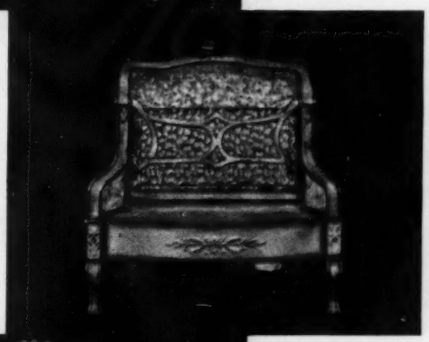
will not Tarnish!



The Haddon Hall Model 10 Elements



The Colonial Model 10 Elements



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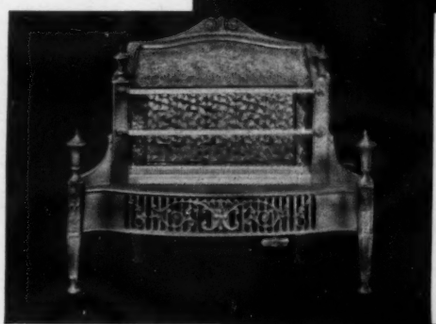
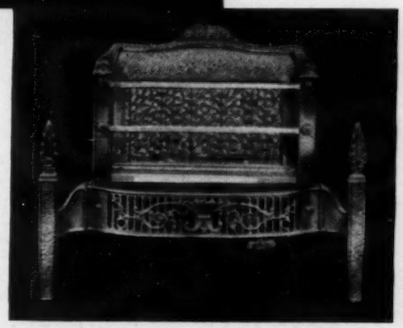


The Adam Model 10 Elements



The Mayfair Model 10 Elements

HERE is one of the biggest, exclusive advantages over sales competition you can have. You can GUARANTEE that Guardian gas heaters will not rust or tarnish. Any Cordeveaux-finished Guardian heater that shows any sign of tarnish within a year will be replaced free of charge.

The dealer who sells Guardians has other definite selling advantages. Quality for quality, he can undersell competition. He has a complete line, ranging from $14.50 to $90, retail.

Guardians Outsell Other Heaters in Competitive Floor Displays

The graceful designs, sturdy materials, obviously excellent workmanship and the multi-colored beauty of Cordeveaux finish enable Guardians to outsell any other heaters, when models are placed in a competitive floor display. For Guardian prices are amazingly low for sound quality heaters.

And now you have the added advantage of being able to guarantee that the finish is positively tarnish-proof.

Order samples of the five models shown and complete illustrated catalog.

THE GUARDIAN GAS APPLIANCE COMPANY

1364 East 47th Street ∴ ∴ Cleveland, Ohio

Guardian

FIREPLACE AND PORTABLE HEATERS

TESTING LABORATORY AGA APPROVED

New!

The Guardian Gas-Fired Circulator

Built for Quick Volume Sales

A HIGHLY efficient, large capacity cabinet heater, with a one-piece, cast iron heat chamber, has long been held forth by the gas industry as an ideal to be achieved . . . Guardian design engineers have achieved the ideal. They have gone further. They have surmounted the design obstacles that have here-to-fore made such heaters extremely high priced.

The new Guardian Circulator has exclusive, patented design features that make possible great economies under modern, mass production facilities. Manufacturing economies, in turn, mean lower retail prices, reduced sales expense and greatly increased sales response to intensive selling.

Here is a heater that can be used to build records for quick volume sales. It is backed by a sales plan that will help set such records.

Order a sample model Guardian Circulator immediately and details of the plan to build a quick, record sales volume.

One Piece, Cast Iron Heat Chamber

This casting is the heart of the new Guardian Circulator. It is a strong, one-piece unit wholly free from joints. Durable; no possibility of escaping fumes; provides cast iron's famous resistance to acid corrosion. Exclusive Zig Zag fire travel for extra high efficiency.

• • •

The Circulator's Design Keeps the Floor Delightfully Warm

THE GUARDIAN GAS APPLIANCE COMPANY
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Guardian

CIRCULATORS—PORTABLE and FIREPLACE HEATERS

While ranges, hot plates and laundry stoves, water heaters, and heating equipment have carried the brunt of the 1929 sales program, with refrigerators coming forward in an encouraging way, considerable may be said for gas-fired laundry equipment and portable incinerators. Laundry equipment appears in the sales returns of 39 companies participating in the survey, and in some cases the entries are sizeable. Twenty-one have reports to make on incinerators. Both laundry equipment and incinerators will be added to the list of appliances actively pushed by an increased number of companies in 1930.

Any relative analysis of sales per meter which might be attempted from the tables which accompany this article would be more confusing than illuminating, because of the many factors which make it impossible to set the information up in comparable form. For example, small properties, in which natural gas was introduced early in 1929, and which lend themselves readily to intensive sales coverage, in some cases may show appliance sales of well over $100 per meter. To expect anything comparable for an established property, operating on either natural or manufactured gas, is obviously absurd. Another confusing element which would make comparison of sales on a meter basis extremely difficult is the fact that some properties include cost of appliance installation with their totals. One company of this latter class shows over $50 sales per meter—a notable sales record even with installation included. The western gas industry for the past several years has refused to stand still long enough to be analyzed, and this is particularly true of sales comparisons.

The same factors which operated to produce the phenomenal increase in gas company appliances sales last year in the West are still with us, and in more abundant measure. First to be mentioned among the circumstances favoring larger sales is, of course, the widening sweep of natural gas service. Particularly does this apply in western America, where the year 1929 saw natural gas introduced to several hundreds of new communities, as well as replacing manufactured gas in several major cities.

Several companion surveys to the merchandising review which accompanies this article are offered in other sections of this issue—one of them listing individual pipe line projects which pushed out the boundaries of natural gas last year, and another tabulating many of the new gas communities brought into service in 1929. It is significant to trace the close relationship between the growing gas appliance market in the West, and this remarkable natural gas expansion. Current and projected extensions of natural gas service call for a sales curve with a sharp upward incline, to justify the tremendous investments now being made in physical facilities, if for no other reason.

TABLE NO. 1. GAS REFRIGERATOR SALES AND QUOTAS FOR SEVERAL WESTERN COMPANIES

COMPANY	Number Sold 1929	Number Sold 1928	Quota 1930
Little Rock Gas & Fuel Co., Little Rock, Arkansas*	20	..	..
Coast Counties Gas & Electric Co., Santa Cruz, California	2	..	75
Inland Empire Gas Co., El Centro, California	1	..	10
Pacific Gas and Electric Co., San Francisco, California	22	..	..
Southern California Gas Co., Los Angeles, California	223	126	500
Southern Counties Gas Co., Los Angeles, California	752	179	1020
B. C. Electric Power & Gas Co., Ltd., Vancouver, B. C., Canada	12	3	21
The Pueblo Gas and Fuel Co., Pueblo, Colorado	41	10	50
Cedar Rapids Gas Co., Cedar Rapids, Iowa	9	2	..
Council Bluffs Gas Co., Council Bluffs, Iowa	5	..	20
Des Moines Gas Co., Des Moines, Iowa	22	8	10
Iowa City Light & Power Co., Iowa City, Iowa	51	28	60
The Capital Gas & Electric Co., Topeka, Kansas**	104	2	200
Peoples Utilities Kansas Corp., Lawrence, Kansas	8	..	..
Kansas Pipe Line & Gas Co., (for Western Gas Co. system, purchased in 1929.)	16	..	..
Louisiana Public Utilities, Mansfield, Louisiana	..	..	3
Minneapolis Gas Light Co., Minneapolis, Minnesota	600	89	1200
Minnesota Northern Power Co., Minneapolis, Minnesota†	26	..	60
The Gas Service Co., Kansas City, Missouri	496	2	..
Great Falls Gas Co., Great Falls, Montana	31	10	18
Metropolitan Utilities District, Omaha, Nebraska	38	2	100
Portland Gas & Coke Co., Portland, Oregon	327	61	400
Southern Oregon Gas Corp., Medford, Oregon	13	..	20
Municipal Gas Co., Dallas, Texas	9	..	19
United Gas Co., Houston, Texas	37	..	..
Texas Border Gas Co., Laredo, Texas (Subsidiary of United Gas Co.)	..	..	5
Puget Sound Power & Light Co., Seattle, Washington	2	2	..
Seattle Lighting Co., Seattle, Washington	5	..	300
Spokane Gas & Fuel Co., Spokane, Washington	33	8	100
Laramie Gas Co., Laramie, Wyoming	2	..	15

*Total for six months operation from July 1, 1929.
**Also included in The Gas Service Co. totals.
†Totals for Black Hills Utilities Co. and Montana-Dakota Power Co.

Another factor making for heightened sales activity, and one which operates with no distinction between "natural" or "manufactured" gas territory, is simply a wider recognition of the impelling necessity for direct sale of all types of appliances by gas utilities. In recent months a number of important companies have made their decision to assume their own responsibility for load-building, and there is little doubt that this movement will go forward until it encompasses every important unit in the industry.

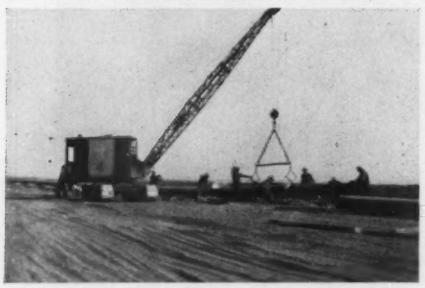
The final factor for continually great sales lies in the methods being employed by leading merchandising departments. Gas companies, be it said, are not only "in the merchandising game," but in with both feet. The past year has seen scores of sales offices opened by western companies; it has seen more stress laid upon appliance display in company headquarters; sales budgets and sales personnel have increased in a marked way, and all the established modern avenues for sales promotion have been utilized. Not in every company will these remarks apply, but for the majority of the western gas companies which are accountable for the bulk of the selling, it may unquestionably be stated that a better job is being done year by year. Competition may have forced it, but in any event the industry now has an active sales sense.

Concluding this brief comment upon current sales results, a word of appreciation should go to those companies which have cooperated to make the *Western Gas* merchandising survey possible. This year's survey is a pioneer attempt, covering a field in which the industry needs much more definite knowledge than has ever been available. With practically all of the major companies serving western territory included in the review, a comprehensive sense of the efforts being put forth and the results yielded may be gained. The reader is heartily recommended to the detailed reports of sales work and proposed programs, as set forth in the accompanying tabulations.

MUIRHEAD NAMED TREASURER OF ARKANSAS NATURAL GAS CORP.

B. R. Muirhead has recently been appointed treasurer of the Arkansas Natural Gas Corporation with headquarters at Shreveport, La. He served the company formerly in the capacity of assistant treasurer.

Mr. Muirhead's first position with the Cities Service organization was with the budgeting department of the Empire Gas & Fuel Company at Bartlesville. In 1928 he joined the Arkansas Natural to take charge of the budgeting department with this company. Later in the year he was promoted to the post of assistant treasurer. He is a graduate of Washburn College and took a post-graduate course in business administration at the University of Nebraska prior to joining the Doherty interests.



UPPER: Cleaning pipe in the field. CENTER: Vista Hills line route; Standard Gasoline Company absorption plant at left. CENTER: Lining up and tacking. LOWER: Making a rolling weld.

Practical Pipe Line Quick Work *of*

By H. P. GEORGE

AS the diamater of transmission lines grows larger the task of line construction presents new aspects. Methods alter to accommodate problems peculiar to the larger sizes, and each natural gas line which goes into service is significant because it advances the knowledge of methods which prove practical under field conditions.

In the construction of the 20-inch gas carrier which ties its system into the vast Kettleman Hills reserve the Southern California Gas Company has brought forward some new wrinkles

IN October, 1929, the Southern California Gas Company undertook the construction of a 20-inch pipe line from the Kettleman Hills field in Kings County, Calif., to the Buena Vista Hills field in Kern County, Calif., a distance of approximately 70 miles. The topography of the country traversed by this pipe line is varied, the first five miles being through hills requiring from 7- to 10-foot cuts and the use of "A" frames to support the pipe where it spans canyons exceeding 60 feet. From the foot of Kettleman Hills to a point where the line enters Elk Hills, the country is level for approximately 40 miles, with the exception of about four miles of rolling hills east of Devils Den and where the line crosses under an occasional deep wash. Through Elk Hills the topography is similar to that in Kettleman Hills and numerous deep cuts were necessary, as well as the use of "A" frames to support the line across deep washes and canyons.

The A. O. Smith Corporation of Milwaukee, Wis., was awarded the contract to furnish the necessary pipe and was also given the contract to do the field welding and furnish the necessary welding rod, welding equipment and a personnel trained in the "Smith-weld" method of arc welding.

The Macco Construction Company of Los Angeles was awarded the general contract for all work incident to the construction of this line, with the exception of the field welding and the unloading, hauling and stringing of the pipe. The company's mechanical equipment consisted of three trenching machines, three cranes equipped for lining and lowering pipe, two backfillers, seven caterpillar tractors used for moving welding equipment, painting machines and for backfilling, and, in addition, six trucks of various capacities. A field construction camp and office was maintained on the pipe line and was moved as work progressed. This camp contained tents for sleeping quarters, a kitchen and mess hall, together with a shop for making repairs to all mechanical equipment. The field organization was made up of a superintendent and assistants, field engineer, several foremen for the various operations, and a crew of approximately 80 men.

The pipe was 20-inch O.D., Smith welded steel, with 9/32-inch thick walls, in 40-foot lengths with bell ends. It was shipped by rail and unloaded at three convenient railroad stations by means of a crane onto trucks and hauled to the right of way, where a crane again unloaded the pipe from the trucks and strung the lengths end-to-end in a line parallel to and approximately 10 feet from the center line of the ditch. The contract for unloading, hauling and stringing of the pipe was awarded to the Asbury Transportation Company of Los Angeles.

Grades were established along the right of way to insure, as far as practical, uniform gradients. The ditch was dug 30 inches wide to an average depth of 50 inches by three ditching machines Hand digging was resorted to where cuts were too deep and grades too steep for the machines to operate efficiently.

All pipe ends were thoroughly cleaned with gasoline to remove dirt, grease and paint, by a cleaning crew which followed behind the ditching machines and ahead of the lining-up crew. Skids (4-inch x 6-inch x 10-feet long) were laid in pairs across the ditch, two pairs to each length of pipe. With the aid of a level, blocking was used under the skids in order to establish uniform grade on which a 400-foot section of pipe could be rolled. It was found that by laying skids to a grade, the rolling of these long sections was greatly facilitated and was well worth the extra time required. Four wheel dollies were placed on each pair of skids and the pipe was laid on these dollies in order to facilitate the rolling of the string while welding.

The pipe was placed and lined on these dollies by means of a crane equipped with pipe tongs, the operation being as follows:

After the first joint of pipe was placed on the dollies on the skids over the ditch, a steel center ring 3 inches wide and with a slightly raised lip in the middle was inserted in the bell end. The crane then moved ahead, picked up the next length and inserted the bell end over the center ring with the other end of the length slightly elevated. The top of the joint thus made was tack-welded while being held in position by the crane, and as soon as the tack weld

Field Methods Made This Project

General Superintendent
Southern California Gas Company

in pipe line construction. Laying skids to exact grade to facilitate rolling of long sections of pipe is one example; tack-welding pipe lengths which are held in position by a crane is another; and the use of spray guns for applying second and third paint coats in the field is an instance of how Southern California Gas Company construction men adapted time-saving agencies to new uses.

H. P. George describes these and other practical innovations which were introduced during this line project, in the pages which follow.—EDITOR.

was completed on top, the length was lowered onto the dollies, thus forcing the bell end into positioin over the center ring so that the bottom tack could be made. The crane moved ahead to pick up the next length of pipe while the bottom tack weld was being made.

As Fig. 1 illustrates, the center ring provides a convenient means of lining the pipe and serves as a spacer for the weld and further prevents the molten metal from entering the interior of the pipe or forming icicles on the interior, thus facilitating field construction.

The field welding organization consisted of 10 experienced welders, one tack welder with the line-up crew, six rolling welders and 3 bell-hole or tie-in welders. A portable gas-engine-driven

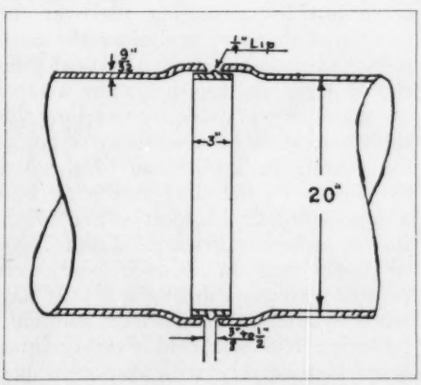


Fig. 1. Cross-section of joints showing center ring.

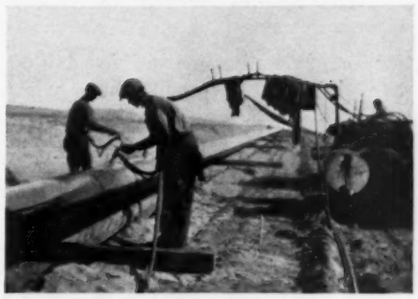
electric generating unit was provided for each of the 10 welders. These generators produced a 600 Amp. 30 V. current, which was transmitted through two heavily insulated wires approximately 200 feet long; one terminated at a semi-circular contact which was laid on the pipe, and the other was connected to the welding rod holder. These portable generating units were mounted on four-wheel trailers and were moved along the line by means of caterpillar tractors. Two sizes of welding rods were used, 3/16-inch diameter for tie-in welds and 5/16-inch diameter for rolling welds. This material was furnished by the A. O. Smith Corp. The smaller size rod was used for tie-in, or bell-hole welds, in preference to the larger, because the large puddle made by the 5/16-inch rod had a tendency to float. The smaller rod made it easier for the welder to place the metal and hold it, especially on overhead welding.

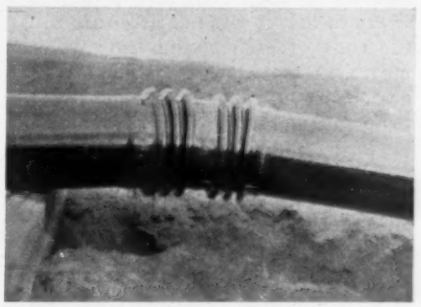
In the process of making the rolling welds, the pipe was rotated by means of a large chain tong operated by two men, the speed of rotation being such that the welder continually worked it on near the top of the joint. A two-pass electric weld was made. The first weld deposited a small amount of metal at the bottom of the V joint, after which a helper scraped the weld clean of any slag or bubbles and wire brushed it thoroughly clean. The second or finishing weld was then made, building up the weld 1/32 to 1/16-inch above the outside pipe surface. The total width of the weld was approximately 1 inch. Sections of approximately 10 lengths, or 400 feet, were welded on skids by means of rolling welds and under favorable conditions each rolling welder could complete about three 20-inch welds per hour. The rolling welders were usually working approximately three-quarters of a mile behind the line-up crew.

After the long sections of 10 joints or less had been completely welded, the dollies were removed from underneath the pipe, which was let down on the skids, and a small gang then dug the necessary bell holes, or otherwise prepared the grade so that these long sections could be joined together by means of tie-in welds. The tie-in weld was made by entering a center ring in the bell end of one section and slipping the bell end of the other section over the center ring into position. Caterpillar tractors were used to move these long sections for making this joint. As in the case of the rolling weld, the tie-in weld was a so-called two-pass weld, wherein the helper thoroughly scraped and cleaned the first weld before a second or final weld was made. The tie-in operation was usually about a mile behind the rolling welders.

The welding gang of 10 men, as above described, completed on an average of about 120 welds for a 9-hour day. However, under favorable weather conditions and through level country, such a crew should average 150 20-inch welds per 9-hour day.

Smith corrugated expansion fittings (See Fig. 2) were used at all points where it was desired to provide some means for absorbing expansion and con-





UPPER: Cleaning pipe in the field. CENTER: Spray gun painting—one of the construction "wrinkles" developed on the Southern California Gas Company project. LOWER: Expansion joints.

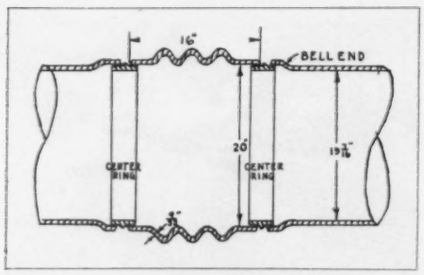


Fig. 2. Expansion joint.

traction of the pipe line and, in addition, they were used to provide angles wherever necessary. These special corrugated fittings were also used for making tie-in connections where lengths of a mile or so were connected after having been subjected to an initial test on skids. Their particular design made them suitable for this purpose, because they permitted the 20-inch pipe to be inserted into the fitting, using the fitting as a sleeve so that it was not necessary to cut the ends of each section to any exact length to make the final joint. Also, any contraction or expansion due to temperature changes is readily absorbed by the expansion feature of this fitting. One of these corrugated expansion fittings was also used on the down stream side of every main line valve in order to allow some flexibility at the valve. This expansion fitting can be briefly described as being 16 inches long overall and having three corrugations approximately 2 inches deep and 2 inches wide, and having an inside diameter a trifle larger than the outside diameter of the 20-inch pipe. The inside diameter was approximately the same as the inside diameter of the bell end of each length so that this fitting could be welded into a line by using a center ring in the bell end of one joint and slipping the fitting onto the center ring to complete the joint.

Where tie-in welds were made, the bell end was usually cut off, which permitted the pipe to slip inside the expansion fitting. This corrugated expansion fitting can also be used to advantage in making pipe line repairs, since it eliminates the necessity of close cutting and fitting as would be the case if a straight butt weld were made.

Venturi type worm-gear-operated lubricated plug valves or cocks were used as main line shut-off valves. These were 20-inch flange connected, built and tested for 500 pounds working pressure. They were installed approximately every 4½ miles, their location being governed by road intersections, railroad crossings, etc., so as to make them readily accessible.

On each side of each main line shut-off valve a 6-inch flanged nipple was welded into the line with a 6-inch flanged valve attached thereto to serve as blow-off connections. The 20-inch main line valves, together with the 6-inch blow-off valves, were enclosed in redwood boxes provided with suitable vents.

Main line drips and bleeders (See Fig. 3) were installed to suit the particular topography of the country traversed by this pipe line. At low points of long stretches, the leg-type drip was used and where short dips occurred, 3-inch bleeders were welded into the bottom of the line. The drips were made of 20-inch pipe approximately 13

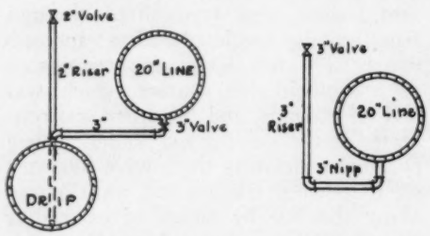


Fig. 3. Left: Diagram of main line drip. Right: Main line bleeder.

feet in length and were placed below and to one side of the main line. The connections between the main line and the drip were 3-inch nipples and elbows and valves, all suitable for 500 pounds working pressure. A 2-inch outlet connection was provided from each drip chamber, with a riser long enough to reach above the ground, the end above ground being fitted with a 2-inch valve.

A soil survey was made in order to determine what type of protective coating should be applied. Certain sections indicated a rather high corrosive index, but in general soil conditions were found to be good. Owing to the arid climate in this district, the moisture content of the soil is very low, and for this reason, a schedule was adopted which provided for the application of cold paint generally, with special applications at those certain sections where severe conditions existed, and in those cases wrapping was used.

"Blowing down", on the Kettleman Hills-Buena Vista Hills line.

All pipe received a priming coat at the mill before shipment. However, it was found that the priming coat was injured to such an extent in transit and in handling that it was necessary to clean and prime the pipe in the field before the additional protective coatings were applied. The field cleaning was accomplished by the use of two small motor-driven air brushes, the power being supplied by a portable gas-engine-driven air compressor. The two men operating these motor-driven brushes thoroughly cleaned the top and sides of the pipe, and a crew following these two men completed the job, using wire brushes and rags. The priming coat was then applied, using the canvas sling method.

The second and third coats were applied by the use of spray guns. The air necessary to operate these spray guns was supplied by a portable gas-engine-driven air compressor which delivered compressed air at approximately 60 pounds pressure. The paint was supplied to the spray guns from a 100-gallon tank. The portable air compressor and the paint tank were mounted on skids and were pulled along the right of way by means of a caterpillar tractor. Two such units were used on this job and each unit provided two hose connections and served two spray guns. Each unit was operated by a four-man crew—two spray men, one helper and a tractor operator. A spray man operated on each side of the pipe line covering the top and sides of the pipe. The needle valve on each spray gun was so adjusted that by holding it about 18 inches away from the pipe, a width of approximately 5 inches would be covered by the spray. It developed that two spray guns could not easily cover the entire circumference, too much time being lost in attempting to cover the bottom of the pipe, and since the compressor equipment provided was not sufficiently large to furnish air for a third spray gun, it was necessary to follow this spray operation by a small crew applying coating to the bottom of the pipe by the use of the sling method. This also provided final inspection and touching up where necessary. From 5,000 to 6,000 feet of 20-inch pipe were painted two coats during a 9-hour day, when weather conditions were favorable. Morning fogs and cold weather interfered considerably with consistent performance.

(Continued on Page 116)

PACIFIC COAST GAS ASSOCIATION

447 Sutter Street, San Francisco, California
A Department Conducted by Clifford Johnstone, Managing Director

Include Seattle Meeting in Your Vacation

PLANS for the Annual Northern Regional Conference of the Association, to be held in Seattle, June 26 and 27, are rapidly nearing completion and the program will appear in the June issue of *Western Gas*. Every care is being taken to secure speakers who have a definite message to deliver, whether their subject be on accounting, sales, engineering or public relations. The program will be informal and opportunity will be given everyone for questions and discussion on each subject.

Seattle and the entire Pacific Northwest is so delightful in June that it makes a wonderful vacation trip.

Cooperative Advertising Bulletins

THE Cooperative Advertising Committee has mailed Bulletin Number 2 to Commercial members of the Association and to gas company executives. This bulletin will be followed from time to time by others detailing progress and possibilities in cashing in on the cooperative advertising in actual load-building and merchandising results. These bulletins are supplementary to the original portfolio and should be added to it.

The second bulletin contains proofs of a number of trade journal advertisements, schedules for these advertisements and for outdoor advertising, detailed results on "fan" mail resulting from the radio programs, and something on the manner in which various gas companies are using the campaign to develop new business.

Architects Manual Nears Completion

THE task of preparing a comprehensive manual of information on gas fuel for architects, builders and contractors is drawing to a close. Frank Moon of the Los Angeles Gas and Electric Corp., chairman of the committee in charge of this important activity, has completed the assembly of the first draft and this is now being circulated for suggestion and criticism. It is planned to complete this phase of the work during May so that the manual in its final form can be presented to the Board of Directors at their June meeting with request for authorization to publish it.

Convention Committees Start Work

ON APRIL 21 and 22, O. L. Moore, general convention chairman, called meetings of those who are to assist in planning for the Pasadena convention to be held September 9 to 12 at Hotel Huntington. In addressing the members of his executive committee Mr. Moore impressed upon them that this was to be no ordinary convention. No convention held so close to Los Angeles can afford to be ordinary. This convention will break records in attendance, in power of its speakers, in the beauty of its surroundings, in the variety of its entertainment, in . . . . . but why go on; it will break all records —bar none.

The executive committee members are: O. L. Moore, general chairman, Los Angeles Gas & Electric Corp.; D. L. Scott, program chairman, Los Angeles Gas & Electric Corp.; N. R. McKee, hotel chairman, Southern Counties Gas Co.; L. H. Dell, entertainment chairman, Southern California Gas Co.; Wm. M. Thompson, golf chairman, Reliance Manufacturing Co.; W. F. Thurber, publicity chairman, Southern Counties Gas Co.; Geo. Campbell, transportation, Los Angeles Gas & Electric Corp.; Wm. Maddock, program manager, Los Angeles Gas & Electric Corp.; A. R. Bailey, attendance manager, Los Angeles Gas & Electric Corp.; C. H. Potter, reception and hospitality, Southern Counties Gas Co.; W. C. F. West, registration; Los Angeles Gas & Electric Corp.; J. C. Gilbert, banquet, Southern Counties Gas Co.

Another Convention Milestone for Arizona Group

AS those who have attended them know, the essence of Arizona Utility Association Conventions is hospitality. The Phoenix Convention on April 16 to 19 was no exception, and in addition the program was well rounded and instructive.

The Arizona Biltmore, situated in the desert, about 10 miles from Phoenix proved to be an ideal convention hotel and the 200 men and women attending the convention were deeply impressed by its unique beauty and by the fascination of the desert.

The business program had exceptional merit and was interesting and well balanced, from the able address of President L. V. Seares on Wednesday afternoon to the reports of committees on Saturday morning. The Gas Section Program on Thursday morning was opened by Capt. A. E. Higgins, field representative of the American Gas Association, who initiated his listeners into the psychology of success in sales. He was followed by J. A. Harritt, of San Diego, who described, and illustrated with slides, the latest developments in oil gas manufacture, including the complete gasification process developed experimentally at San Diego by L. B. Jones.

C. H. Webber of Tucson then discussed the possibilities of house heating in Arizona, basing his optimism upon the success of the Tucson company in securing this class of business.

W. M. Henderson of Los Angeles delivered an inspirational address appealing for thoroughness in rendering service. Mr. Henderson believes that each gas company should make periodical inspections of customers' appliances in order to insure their efficient operation at all times.

The closing address was by R. E. Fischer of San Francisco, vice-president of the Pacific Coast Gas Association, and in the absence of Mr. Fischer, was read by Don C. Ray, manager of public relations, Pacific Gas and Electric Company. Mr. Fischer's subject was "The Royal Road to Sales", but he proved that the road is a rocky one save to those willing to analyze their markets and work hard to sell them.

Arizona was ably represented on the program by P. G. Spillsbury, president of Arizona Industrial Congress, and C. C. Cragin, general manager, Salt River

Valley Water Users Association. The electric men were also well represented, the speakers including E. B. Criddle, president of Pacific Coast Electric Association, G. C. Tenny, editor, Electrical West, R. W. Turnbull, Edison General Electric Appliance Company, and W. L. Frost, Southern California Edison Company.

One of the outstanding talks on the program was a sermon by D. L. Scott of the Los Angeles Gas & Electric Corp. Mr. Scott took his text from the first chapter of Exodus—"Now there arose a new King over Egypt who knew not Joseph"—and developed it into a powerful appeal to public utility managements to educate employees to know their customers.

The convention closed on Saturday morning with a short business session at which the following officers were elected: president, A. F. Morairty, assistant general manager, Central Arizona Light & Power Company; first vice-president, J. P. Sexton, manager Arizona Edison Company, Douglas; second vice-president, C. F. Webber, superintendent gas distribution, Tucson Gas Electric Light and Power Company; executive secretary, J. S. Arnold, sales promotion manager, Central Arizona Light & Power Company directors are Willis T. Johnson, manager Yuma Utilities; L. V. Seares, general manager Arizona Power Company; G. T. Herrington, general manager Arizona Electric Power Company.

The Arizona Biltmore, Phoenix, was chosen as the meeting place for 1931.

Committee Appointment

Mr. W. A. Bahr, chairman of the production committee, reports the appointment of B. G. Dick of Portland Gas & Coke Company as chairman of committee on Corrosion of Gas Plant Equipment, to replace F. C. Hawks of Tacoma, resigned.

STANDARD OF CALIF. FORMS MANAGEMENT COMPANY

Organized as a subsidiary of the Standard Oil Company of California early in April, the Standard Management & Operating Company will serve as a connecting link between the Petroleum Company and its subsidiaries operated under Pacific Public Service Corporation. E. F. English, formerly in an executive post with Pacific Public Service Corp. before it came under Standard control, is president of the new company, and R. W. Hanna, a director of Standard Oil Company of California, is vice-president. R. N. Drieman has been appointed secretary and J. H. Tuttle, treasurer. The new company is understood to have under way a comprehensive survey relating to natural gas distribution in the Pacific Northwest.

F. Q. CANNON OF HONOLULU ON CALIFORNIA BUSINESS TRIP

Frank Q. Cannon, manager of the Honolulu Company, Ltd., Honolulu, T. H., spent some time in California during April in the interests of new construction contemplated by his company. He made the voyage across on the Malolo, landing in Los Angeles, April 19. During his stay in California he visited local gas utilities offices in both northern and southern parts of the state.

J. E. DAVIES LEAVES WEST COAST FOR CHICAGO

J. E. Davies, general manager of the Peoples Gas Stores, Inc., merchandising organization for the Peoples Gas Light & Coke Company, returned to Chicago in April after wintering in Pasadena, Calif.

SO. CAL. GAS CO. BEGINS WORK ON 43-MILE EXTENSION

WORK has commenced on the high pressure transmission line which will serve Wasco, Delano, Shafter, and McFarland, California, with natural gas, and construction will start immediately on laying the distribution systems in these towns, according to W. C. Cameron, manager for the Southern California Gas Company in that district. Gas from Elk Hills, Buena Vista Hills, and Kettleman Hills gas fields will be served, and the first homes reached will have natural in about 60 days.

Final approval was given to the Southern California Gas Company by the California Railroad Commission on February 26, after hearings during January and February in Bakersfield and San Francisco. Franchises have been granted by the supervisors of Kern County, and a franchise is now pending in Delano.

Southern California Gas Company is expecting to expend approximately $325,000 in this territory for these new lines, according to Mr. Cameron, who estimates that within a year approximately 1,000 customers will be added to the load.

This project calls for the laying of 43 miles of new transmission line, from a point east of Rio Bravo north to Delano by way of Shafter, Wasco and McFarland. Part of the line will be 6-inch and part 4-inch.

Representatives of the Southern California Gas Company are working in this territory, explaining the service, and the rates, and receiving requests for natural gas service.

Domestic rates have been filed with the California Railroad Commission covering domestic business, service to natural gas engines, and the industrial and commercial users of gas.

MANY BUTANE APPLICATIONS IN CALIFORNIA

Application has been made to the California State Railroad Commission for permission to serve a total of 60 California towns with liquefied petroleum gas, according to Claude C. Brown, gas administrator for the Commission, in an announcement made late in April. The towns in question have been without gas service to date.

NATURAL GAS DELIVERIES* IN LOS ANGELES, ORANGE, RIVERSIDE AND SAN BERNARDINO COUNTIES, SOUTHERN CALIFORNIA

Year 1929

Compiled by R. M. Bauer, Gas Supervisor, Southern California Gas Company

All Figures in M.C.F.

	January	February	March	April	May	June
Domestic Sales	4,586,335	4,751,429	4,124,058	3,576,669	2,651,290	2,112,069
Gas Engine Sales	21,567	12,728	15,837	22,537	69,933	102,838
Industrial Sales	3,709,919	3,463,720	4,000,510	3,452,083	3,907,376	3,943,041
Sub-total Sales	8,317,821	8,227,877	8,140,405	7,051,289	6,628,599	6,157,948
Company Use Unaccounted-for and Transport Gas	2,752,548	1,694,493	1,782,294	1,495,210	1,435,235	1,635,727
Total Gas Handled	11,070,360	9,922,370	3,922,699	8,546,499	8,063,834	7,793,675

	July	August	September	October	November	December	Total
Domestic Sales	1,761,556	1,662,327	1,725,323	2,000,514	2,811,009	3,679,982	35,442,561
Gas Engine Sales	118,577	121,034	111,694	93,358	86,051	70,778	846,932
Industrial Sales	2,841,523	3,143,319	3,703,549	4,401,576	4,236,619	3,913,967	44,717,202
Sub-total Sales	4,721,656	4,926,680	5,540,566	6,495,448	7,133,679	7,664,727	81,006,695
Company Use, Unaccounted-for and Transport Gas	2,221,036	2,126,188	2,037,552	2,361,036	2,359,259	2,101,798	24,002,376
Total Gas Handled	6,942,692	7,052,868	7,578,118	8,856,484	9,492,938	9,766,525	105,009,071

*By Los Angeles Gas and Electric Corporation, Southern California Gas Company, Southern Counties Gas Co. and Gas Department City of Long Beach.

Natural Gas in a

Sugar Refinery

(Continued from Page 71)

ash dump pockets were closed over and filled in with insulating material to protect the concrete and steel from the heat and also to form a level floor line on which to lay the furnace floor. The front walls of the boilers were supported while removing the stokers and as fast as the stokers were removed the gas burners were bricked in, the front walls and floors completed, and the boiler put on the line using gas. The entire boiler room was changed over in this manner without mishap or interruption to service. A sectional side elevation of one of the furnaces changed in this manner is shown in Fig. 1.

The boilers are in two lines facing each other. A single 12-inch welded header 320 feet long is suspended from the concrete coal bunker overhead down the center of the firing aisle. A 5-inch lateral heater feeds each boiler with a chain-operated Chapman gate valve at the header and a 250-pound globe valve at each furnace front for hand regulation of all five burners. Each burner is provided with a 2-inch Merco Nordstrom cut-off cock. The average pressure carried on the burners is 7 pounds. The main header pressure is 12 pounds. A large double faced illuminated dial gas pressure gage is visible from both ends of the boiler room. Westcott orifice meters measure the total gas below the high pressure Emco regulator, with Duplex orifice meters on the by-pass for holiday measurements. Below the meters are other regulators for reducing to burner pressures for the boiler room and char house, with a deducting orifice meter for the char house gas.

The boiler ratings vary suddenly from less than 100 per cent to 250 per cent. The average boiler horse power developed is about 10,000. It will be noted from the meter chart in Fig. 2 that the fluctuations in steam demands are intense and abrupt. The particular chart shown from one boiler indicates several variations from 50 to 200 per cent rating. On account of limited furnace volume and sudden changes in steam demands it was necessary to install short flame high pressure gas burners. Forney natural draft combination gas and mechanical atomizing burners were installed—five in the front of each boiler, as shown in accompanying illustrations. As the refinery was using fuel oil in the char house, and formerly used oil in the boiler house and was already equipped with ample storage facilities, it was a comparatively easy matter to provide oil as auxiliary fuel to be used in the event of an interruption to the gas supply due to possible breaks in the high pressure line. Only a few minutes per boiler are required to change from gas to oil burning with these burners.

In the char house the 38 furnaces were changed by taking out the grates and installing Forney natural draft gas burners in the approximate location of the oil burners. The furnace floors were lowered and air openings provided for emergency use of oil (which openings remain closed when burning gas) and the steam atomizing oil burners installed under the gas burners. These bone black kilns require about 1,500,000 feet of gas daily at practically 100 per cent load factor, and the fires are so regulated as to produce an average of 10 per cent CO_2.

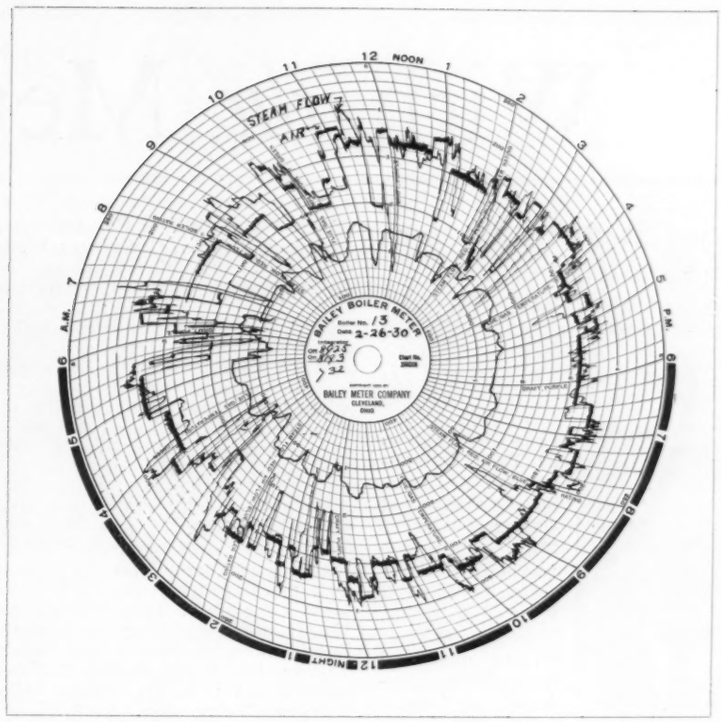


Fig. 2. Chart showing fluctuating steam demands on one of the boilers at American Sugar Refinery plant.

The boiler room is well equipped with instruments and accurate operating data are kept, the efficiency figures being calculated daily. Each boiler is equipped with a boiler meter and a CO_2 recorder. Two firemen and one water tender handle the entire boiler room operations.

Fig. 2 is a reproduction of a boiler meter chart which indicates the extent of the demand on the gas burners. The gas and draft regulation is by hand. The drops in percentage of CO_2 are readily noticed on CO_2 charts and conform to the drops in load on the boiler. Aside from the intervals of extreme drops, however, the CO_2 is maintained at 10 per cent and for periods 11 per cent. The recording CO_2 machines are checked by hand analyzer, as well as checking for CO, the formation of which, when burning natural gas, is not so important as the accompanying losses due to unburned H_2 and CH_4, the presence of which are not detectable with the Orsat. On the boiler which was allowed to carry more of the steady base load, the CO_2 averages from 10.5 to 11 per cent for the entire 24 hours, with the exception of four short periods of cutting down, which means continuous operation on less than 10 per cent excess air. Theoretical perfect combustion with no excess or deficiency of air with this gas would produce from 11.7 to 11.9 per cent CO_2, which indicates the proximity to perfect combustion which is maintained.

The 12 vacuum pans require about two-thirds of the entire boiler output. With 12 pans taking steam as indicated by the chart from one of them it is easy to understand, even with the diversity factor resulting from operating all the 12 pans at different intervals, how it is possible for total steam requirements to the pans to vary as much as 100 per cent in 15 to 20 minutes time. These sudden demands from the evaporating apparatus can be more easily met with gas than with lagging solid fuel fires, and the operators thus avail themselves of the advantage of this fuel.

P. J. KRUESI, HEAD OF AMER. LAVA CORPORATION

John Kruesi, president and general manager of the American Lava Corporation, Chattanoonga, Tenn., since January 1 of this year, passed away late in March at the age of 38, due to an attack of pneumonia. Mr. Kruesi had a wide acquaintance in the gas industry and his many friends will mourn his sudden death.

At a directors meeting held on April 7, 1930, Paul J. Kruesi was elected to the presidency of the company to fill the post left vacant by his brother's untimely death.

Paul J. Kruesi is also president of the Southern Ferro Alloys Company of Chattanooga and a manufacturer of national reputation. Among other honors, he has served as president of the American Electro Chemical Society. He is the founder of the American Lava Corporation.

METER SHORT COURSE PAPERS IN BULLETIN

Papers presented at the Ninth Annual Meter Short Course, held in December, 1929, at Ames, Iowa, have been published in Bulletin 104 of the Iowa State College of Agriculture and Mechanic Arts. The Short Course is conducted annually under the auspices of the Mid-West Gas Association and the Iowa State College. Gas production and distribution topics are included in Bulletin 104, which is issued as one edition of the State College official publication.

OCEANSIDE GAS MAY SERVE CARLSBAD, CALIF.

Carlsbad, Calif., will be furnished gas through a line from the artificial gas plant of the South Coast Gas Company at Oceanside, according to reports made public in April.

With *the* Metermen

Record Registration *for* S. W. Meter Course

THE 7th Annual Southwestern Gas Measurement Short Course which met at Norman, Oklahoma, on April 15, 16 and 17, drew a record attendance of gas men, some of them coming from such distant points as Salt Lake City, Denver, El Paso, Charleston, W. Va., Pittsburgh, Pa., and Columbus, Ohio. Total registration was 475, the largest number by 25 yet to attend the school. The majority of those registered were from Oklahoma and Texas.

D. A. Sillers

The school was marked by the interest shown in the actual class work by those who registered, according to D. A. Sillers, of the Lone Star Gas Company, chairman of the Meter School Committee, who stated that attendance at classes was practically 100 per cent of those registered.

He also stated that the chief value of the school lies in the opportunity for discussion of mutual problems, and in offering a stimulus to each gas measurement man to continue study of measurement problems following return to his company.

C. B. Day, of the Consolidated Gas Utilities Company at Blackwell, Oklahoma, was elected as chairman of the Meter School Committee, succeeding Mr. Sillers. Mr. Day has been very active in the work of the school since its inception and served the past school as chairman of the program committee. Other members of the General Committee are to be appointed in the near future.

The routine of the school which was conducted at the University of Oklahoma, was an assembly period each morning at which general subjects were covered. The afternoon was devoted to class work.

Gas equipment manufacturers who exhibited during the school, and whose representatives took part on the program were: The Bristol Company; The Chaplin-Fulton Manufacturing Company; The Foxboro Company; Metric Metal Works of the American Meter Company; Pittsburgh Equitable Meter Company; Refinery Supply Company; Robinson Orifice Fitting Company; Sprague Meter Company; and Westcott & Greis, Inc.

The Short Course is conducted by the College of Engineering of the University of Oklahoma, assisted by the Corporation Commission of Oklahoma, Oklahoma Utilities Association, Natural Gas Department of the American Gas Association, and the Natural Gasoline Association of America.

The General Committee for the 1930 school follows:

D. A. Sillers, Lone Star Gas Company, Dallas, Texas, chairman; C. B. Day, Consolidated Gas Utilities Co., Oklahoma City, chairman, Program Committee; W. H. Carson, University of Oklahoma, Norman, Okla., director, chairman of Banquet and Entertainment Committee; Earl S. Rush, The Empire Companies, Bartlesville, Okla., chairman, Exhibits Committee; F. C. Walters, Oklahoma Natural Gas Corporation, Tulsa, chairman, Publication Committee; C. W. Robbins, Arkansas Natural Gas Corporation, Little Rock, chairman, Approved Methods Committee; E. F. McKay, Oklahoma Utilities Ass'n., Oklahoma City, chairman, Publicity, Registration and Housing Committee; Eugene Metz, American Meter Co., Kansas City; B. P. Stockwell, Oklahoma Utilities Co., Bristow, Okla.; D. C. Williams, Kay County Gas Co., Ponca City, Okla.; R. H. Lussky, Okla. Corp. Com., Oklahoma City; G. P. Bunn, Phillips Petroleum Co., Bartlesville, Okla.; A. J. Kerr, Pittsburgh Equitable Meter Co., Tulsa; S. J. Frazier, Prairie Oil & Gas Co., Independence, Kansas; R. D. Turner, Skelly Oil Company, Tulsa, Okla. Ex-Officio members: E. A. Clark, Oklahoma Natural Gas Corp., Tulsa; F. D. Frank, The Empire Companies, Bartlesville, Okla.

Outgoing Ass'n Workers *in* Informal Session

ON THE evening of April 16 the Southern California Meter Association administration called the first "pep meeting" for committeemen, officers, and directors, held at Marchetti's in Los Angeles. The purpose of the meeting, which was held as an informal "Dutch lunch", followed by conference committee groups, was to pass on to the new administration such suggestions as had been developed throughout the year.

Forty men were present for the informal gathering, which was voted highly successful. The Southern California Gas Company band, under the sponsorship of L. H. Dell, provided music during the evening. Dialect "bed-time stories" by L. Brendell were also much enjoyed.

Those present at the meeting were the guests of the following firms, which contributed the dinner: Westcott and Greis, Pittsburgh Equitable Meter Company, J. A. Campbell Company, Foxboro Company, Robinson Orifice Fitting Company, Pacific Pipe and Supply Company, and Neilan Schumacher Company.

119 ENROLLED EXTENSION COURSE IN GAS MEASUREMENT

L. P. W. Des Brisay, chairman of the Southern California Meter Association Educational Committee, announces that to date 119 have enrolled for the organization's extension course in gas measurement. Registrations include students from Canada, Mexico, and practically every western state. Three lessons of the 20 comprising the course had been mailed up to the time of the last S.C.M.A. monthly meeting, and the fourth lesson was due to mail about May 1. A 90 per cent return of problem sets which make a part of each lesson, for correction, is reported on lessons issued thus far.

S.C.M.A. Men *in* Regular Meeting, April 24

RETURNING to its official meeting place, the Los Angeles Gas and Electric Corporation Building in Los Angeles, the Southern California Meter Association held its regular meeting on April 24, with 68 present. For the business meeting, following the dinner, the group adjourned to the gas company's auditorium in the same building.

Two papers, both of which appear in this issue of *Western Gas,* featured the program, and spirited discussion followed each.

Clifford Johnstone, managing director of the Pacific Coast Gas Association, was present at the April 24 meeting and spoke briefly to the Association members, stressing his organization's interest in the progress of the meter group, and inviting the members to participate in the P.C.G.A. convention to be held this year in Pasadena, Calif.

GADGET ACTIVITY GETS UNDER WAY AGAIN FOR S.C.M.A.

Another "gadget" contest—conducted, like the first run by the Southern California Meter Association, to bring to light practical devices and methods for use in metering work—is now under way. Carl W. Brockman, who heads the "gadget" activity for the S.C.M.A., explains that the present contest has been extended somewhat in scope, to permit of ideas which cannot be classified as tangible devices being submitted in the contest. Gadgets will be judged and awards will be made when 20 new contributions are in hand.

DURANGO NATURAL HAS CONTEST FOR REPAIRING GAS LEAKS

Durango Natural Gas Company, of Durango, Colorado, recently staged a contest in the repairing of gas leaks. Two repair teams took part, and the rules of the contest were that the work should be completed under actual leak conditions. Each team carried a Dresser leak clamp from truck to supposed leak and placed it in position. The winning team, composed of Harry Hallopeter, C. C. Corcoran and Ed. Fitton, completed the work in 8 minutes and 35 seconds.

FULTON PETROLEUM ASKS FOR THREE COLORADO FRANCHISES

Fulton Petroleum Corporation has applied to the Colorado Utilities Commission for permission to construct a line from its wells on the Garmesa structure, to serve Grand Junction, Fruita, Clifton, Palisade and other towns in Colorado with natural gas. The line would be 26 miles long. Construction of a $125,000 plant at Grand Junction for the purpose of obtaining by-products from the gas, is also planned, according to news reports.

K. B. MILLER WITH INDUSTRIAL FUEL SUPPLY AT ANAHEIM

K. B. Miller, formerly with the Southern Counties Gas Company at Signal Hill, is now located in the dispatcher's office of the Industrial Fuel Supply Company at Anaheim, Calif.

Description *of* High Pressure Orifice Meter Tests *on* Large Diameter Pipe

By B. G. Williams *and* W. L. Cowan*

THE following is an unofficial report of the work done in making tests at the Los Angeles Gas and Electric Corporation's Aliso Street Plant during the summer of 1929. It is purely a descriptive report, giving no data or calculations, only a brief description of the method of making the tests, the apparatus used, and the procedure followed. These tests were sponsored by the Gas Measurement Committees of the Natural Gas Department of the American Gas Association, Pacific Coast Gas Association, and members of the California Natural Gasoline Association, with the cooperation of the U. S. Bureau of Standards, and under the direct supervision of H. S. Bean, physicist and chief of the gas measurement section of the U. S. Bureau of Standards, Washington, D. C.

These tests were a part of a long program of tests sponsored by the Gas Measurement Committee, Natural Gas Department, American Gas Association, which this committee has conducted in cooperation with the United States Bureau of Standards and Bureau of Mines. Other groups of tests had previously been made in Buffalo, N. Y., and Cleveland, Ohio, and more recently at Buttonwillow, Calif.

The purpose of these tests was:

1.To ascertain if orifice coefficients depended upon the actual size of pipe in which the orifice was placed.

2. To study further the effects of varying the rate of flow through the orifice, particularly for very large diameter ratios.

3. To obtain simultaneous data with three sets of pressure taps.

In order to determine the above, it was necessary to use extremely high ratios of differential to static pressures, and also an extremely large range of ratios of orifice diameter to pipe diameter. A complete range of tests was run on orifice meter tubes of 4-inch, 8-inch, and 16-inch nominal pipe diameter.

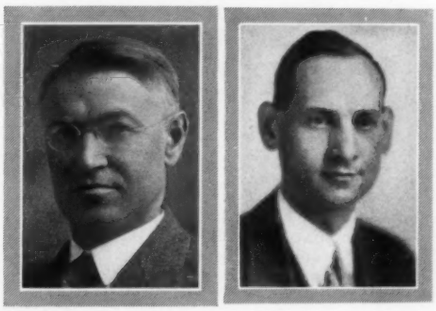
The set-up is shown in Fig. No. 1. The orifice meter tube to be tested was, at all times, set in the location shown in the center. The other six tubes, three on each side of the center, were used as reference meters.

The gas was first passed through the meter to be tested, and then on through the reference meters, and while a large range of differential pressure was used in the meter being tested, the reference meters were operated in such a manner that the differential was at all times practically within the limits for which the velocity coefficient had been established. This was done by turning on additional lines, or changing the size of the orifice as conditions required. These were all tapped for flange connections only, and the static pressure was taken from the down-stream side of the orifice.

The gas used for these tests was a mixture of natural gas from several fields. Practically all of it had passed through absorption plants which had removed most of the gasoline content.

The specific gravity did not affect the tests, as it was the same in all meters.

All differential manometers and mercury pressure "U" tubes were calibrated on the metric scale. They were 100 cm. long, divided into mm. These scales were made from ordinary wooden meter sticks which had been found to give extremely good and accurate results without getting out of adjustment or stretching due to temperature changes, etc.



B. G. Williams *W. L. Cowan*

Three sets of differential pressures across the orifice were used for every test plate, namely pipe taps, throat taps, and flange taps, as shown in Fig. No. 1.

Pipe taps are, of course, located the customary 2½ pipe diameters up-stream and 8 diameters down-stream from the orifice; and the static pressure was taken from the up-stream tap.

*Presented before the Southern California Meter Association, April 24, 1930. Mr. Williams is associated with the Southern California Gas Company; Mr. Cowan, with the Union Oil Company of California.

Flange taps, also commonly used, were placed approximately 1 inch up-stream and 1 inch down-stream from the orifice. In order that results could be more easily compared with commercially used constants, the down-stream static pressure was used.

The throat taps were approximately 1 pipe diameter up-stream from the orifice, and ½ pipe diameter down-stream. For throat taps the up-stream static pressure was used. It might be well to state that throat taps are supposed to be designed to give close to the maximum differential across the orifice.

Two differential gages were used in each of the three test orifice tap connections. One gage was filled with water and the other with mercury. The water, of course, was used for low differentials and the mercury for high differentials.

The differential manometers on the reference meters were filled with water, and the differentials used were such that they never exceeded 100 cm. of water. This differential limit of 100 cm. of water for the reference meters was the factor which governed the number of reference meters used, or the size of plates in the reference meters. Usually the differentials over the reference plates were very much lower than this 100 cm. mark.

All static pressures on both the test meter and reference meters were indicated by means of mercury in the "U" gages. The range of static pressure on the meter being tested was from 19 to 27 lbs. per square inch absolute.

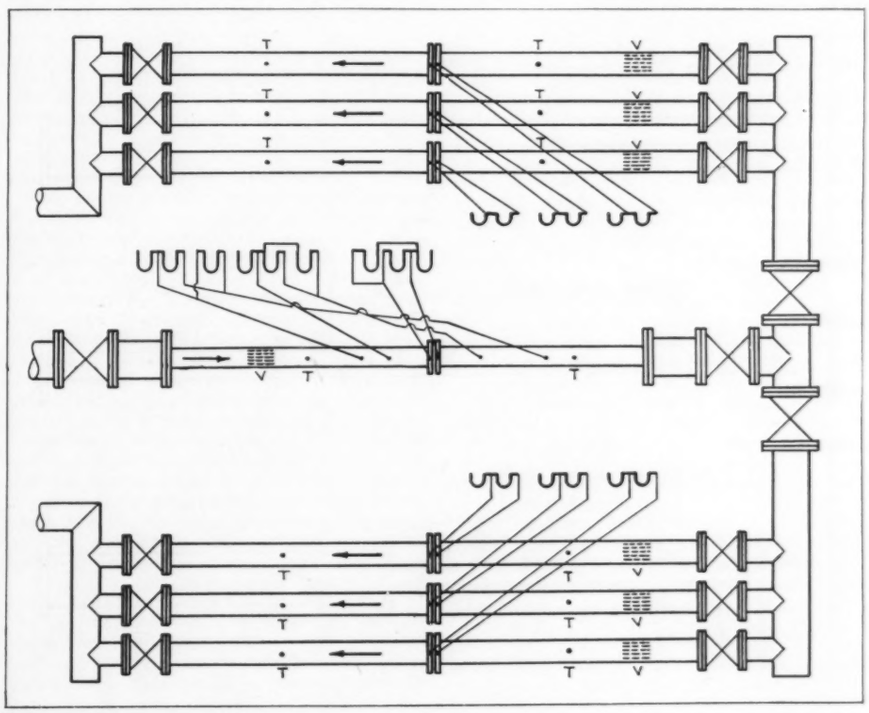


Fig. 1.

TABLE NO. 1

16 Inch Line Nom. D. = 15.382 inches		8-Inch Line D = 8.052 inches		4-Inch Line D. = 4.032 inches	
d (inches)	d/D	d (inches)	d/D	d (inches)	d/D
3.0005	.19507	0.9995	.124130	1.4996	.371925
5.9990	.39000	2.5001	.310494	2.0001	.496057
8.5001	.55260	3.9994	.496696	2.4996	.619940
9.9983	.65000	4.9992	.620864	2.9998	.743998
10.7494	.69883	5.4990	.682936	3.2495	.805927
11.4993	.747096	5.9987	.744995	3.4999	.868031
12.2475	.796232	6.4978	.806980		
12.7486	.82880	6.9997	.869312		
13.2495	.861364				

The manometers were mounted on control boards in the same relative locations as shown in Fig. No. 1, that is, the test meter manometers for one set of reference meters were placed on the opposite side of the hook-up. This arrangement was exceptionally convenient, as it permitted very quick changes of operation when desired.

The pipe diameters of the meters tested and the orifices used in each line are as shown in Table No. 1. Complete tests were made upon each orifice, except that for some of the larger diameter orifices in the 16-inch line, there was not sufficient gas available. Diameter ratios are also shown for each orifice used. The table gives some idea of the scope of the tests.

In Table No. 1 "D" is the average internal pipe diameter in inches. This is the average of both the up-stream and the down-stream diameters.

Plate sizes for the reference meters used are not shown, but it might be mentioned that no diameter of orifice was used in any of the reference meters for which the ratio of orifice to pipe diameter was over .613, or less than .095.

Fig. No. 2 shows the details of the orifice meter tubes which were used in the above tests. Please note that the distance is shown from the plate to each tap, also the location of the straightening vanes, and the thermometer wells. In the 16-inch line the straightening vane is about 13.1 diameters above the orifice; in the 8-inch line it is about 9.7 diameters, and in the 4-inch line it is about 14.5 diameters.

Four of the 10-inch reference meters had been used for other service, and were already equipped with straightening vanes. The distance from the orifice to the down-stream end of the straightening vanes, in these meters, was about 24 pipe diameters.

It was necessary to install straightening vanes in the remaining two reference meters, and these were located approximately 21 pipe diameters above the orifice.

The straightening vanes in the 16-inch meter consisted of a group of 19 pieces of 3-inch Shelby tubing, 30 inches long. In the 8-inch meter, 19 pieces of 1-9/16-inch Shelby tubing, 16 inches long, were used, and for the 4-inch meter, 19 pieces of ¾-inch Shelby tubing, 8 inches long, were used.

In the first four mentioned 10-inch reference meters, the straightening vanes were of the radial type made from sheet iron. In the other two, they were made of 19 pieces of 2-inch Shelby tubing, 20 inches long.

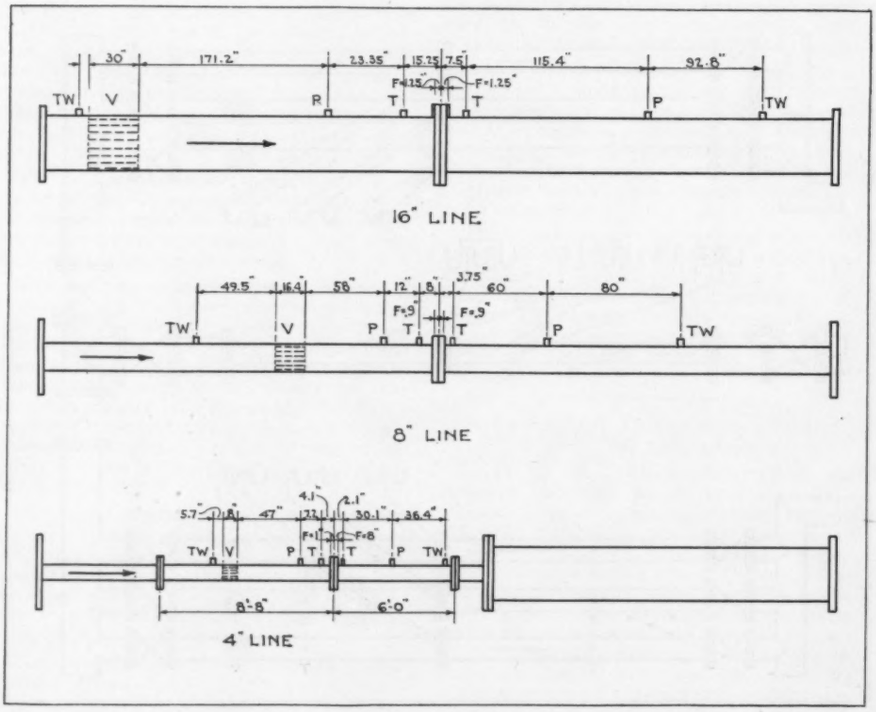


Fig. 2.

METHOD OF OPERATION

The test was started with the 16-inch test meter containing a 3-inch orifice. Runs were made with this orifice for varying rates of flow from ratios of down-stream absolute pressure to up-stream absolute pressure of .99+ to less than 0.50. A sufficient number of runs were made with this plate, so that a very good curve of the calculated coefficients could be plotted.

During each test three men were required to read the differentials and pressures on the meter being tested. There was one man for each set of taps. There was also one man for each reference meter being used. Another man read flowing temperatures for all the meters, and still another gave the signals for reading. When the full set of reference tubes were being used, 11 men were required, besides the one in general charge of the tests. Each run consisted of an average of 10 readings. These were made at the tap of a gong, at intervals of from 30 to 40 seconds. Temperatures of the gas in the lines were read three times during each run. The atmospheric temperature and also the barometric pressure was read at about two-hour intervals. All data were quickly checked, and immediately after each test sufficient results were calculated to determine the trend. These were plotted and if the curve did not appear reasonable, the test was checked at once. The data compiled were very complete, and owing to the care taken there were very few errors.

At this time we will not go into the calculations, as a study of the velocity coefficient employs many long and difficult formulae. There would be sufficient material in the computations alone to constitute a full paper. All we could give at this time would be the formulae given in symbols, and symbols are seldom interesting without definite results.

From the amount of material collected by Mr. Bean, we believe that he will be able to obtain the results for which these tests were intended.

From this and other similar work that is being done, we hope that coefficients can be definitely established for the three types of pressure taps, and also, to definitely set the limiting relation of orifice to pipe diameter for all sizes of pipe, and the amount of differential allowable for any static pressure.

NATURAL GAS RUMORED FOR ARIZONA CENTERS

Persistent Arizona press reports current in April credit the possibility that natural gas may be brought to the city of Phoenix, as well as to various mining centers enroute, from Texas fields. The reports state that eastern capital interested in the project in a preliminary way is considering two routes for bringing gas to Phoenix, one from the Panhandle, the other from El Paso. In the latter event Bixby, Douglas, Globe, Miami and other mining communities would be touched enroute to Phoenix.

PATENTS PENDING ON FEATURE OF DUST SEPARATOR

Editors of *Western Gas* have been advised that the particular design of "Swirl Head" or "Nozzles" shown in the cross section view of the dust separator published with N. D. Holman's article on "Cleaning Natural Gas," appearing in the April issue, is covered by patent applications under the name of D. A. Sillers of Dallas, Texas, and that these features are not subjects for general use.

A Survey *of* Office Practices Which Relate *to the* Use *of* Orifice Meter Charts

By V. E. SCHULTZ
*Richfield Oil Company**

V. E. Schultz *R. N. Brown*

DURING the past few years the natural gas industry has grown with amazing rapidity. It is constantly becoming more and more complex. This growth and complexity has developed several specialized phases of engineering that a short time ago were unheard of. It necessarily follows that gas accounting must also become a somewhat specialized branch of the industry. It is now necessary to keep countless minute and detailed records of everything pertinent to gas measurement, plant operations, etc.

Oil companies used to put an orifice meter on a well for one or two days, determine the volume of gas the well produced in 24 hours, and use that volume for estimating the month. The meter would then be moved to another location and the procedure repeated. Measurements were also made with pitot tubes.

The increasing value of natural gas has made accuracy of measurement a prime requisite. Orifice and displacement meters have been developed so that it is now possible and necessary to measure gas and liquids to a very high degree of accuracy.

The rapid development of the industry has brought into use many different and widely varying methods of computing charts and keeping records relative to gas measurement. Some of these methods are very good, while others have not kept pace with development and have become obsolete. In this paper we will discuss some of the many office practices used. It is felt that an exchange of information along this line will be highly beneficial.

The material for this paper was obtained by sending a questionnaire to 15 gas and oil companies. The information was analyzed and the results are shown below:

All of the companies except one use the date the chart is put on the meter. One company uses the date the chart is removed, and claims that by using this method it is able to get all reports out for any given date one day earlier. The usual information to be found in the center of the chart is the date and the well or location name. The former is usually stamped with an ordinary date stamp. Some companies also write in the size of orifice plate and whether the gas being measured is wet or dry. When using square root charts it is a general practice also to write in the range of the meter and pressure element.

When the charts are brought into the office in some cases they are given directly to the chart readers for computing while in others they are first inspected by the chief clerk or someone who understands field conditions. This man notes any irregularities of pressure or flow and makes notations on the charts for the chart reader's benefit. The latter method has been found successful where chart readers read charts and do nothing else. In instances where charts are read, posted, and the reports made out by the same person this is perhaps unnecessary.

Most companies employ male chart readers and gas clerks.

The gas companies were found to read their charts more carefully than the oil companies, inasmuch as all of their charts are read by the 15-minute and hourly extension methods. In this way the chart reader can read from six to eight charts per hour.

The number of charts read in oil company offices per day varies from 80 to 200 charts per chart reader, depending on the company policy. Most of the charts are read by scanning, while the sales charts and others with widely varying rates of flow are read by the hourly extension method. Some companies have their charts read hourly; the hourly readings are totaled, averaged and the flow computed with comptometers.

In most cases it was found that the average differential, pressure, pressure extension, coefficient and volume were written on the back of the charts. A rubber stamp is sometimes used to stamp a form in which this information is written. Sometimes the information is written on the front of the chart, but this practice is not always so satisfactory because the information cannot be written in the same place on every chart, owing to the different positions of the pressure and differential records. One oil company was found to stamp the date only on the front of the chart. All other information, including the name, is stamped on the back of the chart. This makes for greater ease in posting because it is not necessary to look at the front of the chart for the name and then turn it over to find the volume.

The charts are usually kept in the current file from one to six months and then transferred to the warehouse or storeroom. The big problem with many companies is how long the charts should be kept before they are destroyed. It was found that one company was destroying all charts more than three months old. Some companies keep them six months, some a year, some five years, while some keep them indefinitely. After charts have been kept a year they become quite a problem because they are so bulky and accumulate so rapidly that a great deal of space is required for storing. They should be stored in such a manner that a particular chart can be found without too much trouble. In storing charts safety must also be considered, for they constitute no small fire hazard.

Very few companies were found to use seven-day charts, except where a record of the rate of flow only is desired and no volumes are computed.

Practically all the companies are using half-hour or hour clocks in checking rates of flow where the differential or pressure changes so rapidly that it is hard to compute the volume correctly. These fast charts are finally attached to the 24-hour chart and filed with it.

After charts are computed and volumes obtained it is then necessary to so compile the data obtained that men in charge can easily ascertain as to whether a district is being efficiently handled and gas properly distributed. It is the general practice to post volumes of gas on one ledger sheet and then a recapitulation is made; however, in some cases separate sheets are kept for each meter. In these cases spaces are provided for records for one year. Volumes in all companies are totaled monthly for payment of royalties and usually a 10-day total is made to check distributions throughout a system.

Shrinkages, losses and gains, being of vital importance to a company, are very carefully checked daily, either by men reading charts or by metermen. Most companies favor the chart reader for this particular job, and keep accurate records.

Some companies keep detailed record in their offices of any and all work done on meters, while others leave this up to their metermen. One company has its chart reader mark opposite the volume posted whenever he notes that a meter has been checked. In any event most companies feel that some record should be kept of work done on each meter, and that if any particular meter requires frequent attention steps should be taken to ascertain the cause of the trouble with a view to eliminating it if possible.

In all companies investigated, volumes as recorded by field meters were used as a basis for settlement. It must be understood, however, that in payment of royalties by oil and gasoline companies, shrinkages, losses, etc., were pro-rated back to leases.

In the measurement of high pressure gas we find that only a few companies are attempting to apply a correction factor for the deviation of gas from Boyle's Law. In some instances this factor is specified in the contract; however, one company is making an analysis of the gas and determining the correction by a method similar to the one described in Diehl's Handbook. It is the general practice, however, to disregard the deviation correction and pro-rate the high pressure discharge meters to equal the intake. The latter method will be found correct if the pressure on all the discharge meters remains the same.

Most companies find it good policy to have their metermen make a written report on plate changes, spring changes and meter ranges. In all, metermen make a verbal report on any changes or irregularities that may occur in the field.

It has been found advisable to keep a record of charts which other companies pick up and return for checking, because this makes it possible for a clerk to know at all times where any chart may be found.

Coefficients are usually changed at least once each month, and oftener where conditions warrant. It seems to be the general practice with gas companies to change coefficients if the resulting change makes a difference of ½ of one per cent or more in the coefficient.

*Presented before the Southern California Meter Association, April 24, 1930. Discussion on this paper was led by R. N. Brown.

Air coefficients, specific gravity and temperature corrections used are, in most cases, those published in the California Natural Gasoline Association Bulletin S 282, or those published by the Southern California Meter Association, which are identical with the former. Specific gravities are carried out three decimal places and temperatures and specific gravity corrections four, and although it is not generally practiced, when the product of the multiplication is greater than 1,000, by dropping the decimal the greatest possible error would be only 4/100 of one per cent. In two cases specific gravity and temperature corrections were multiplied together before applying to air coefficient. If possible it would be well to establish some specific method of computing coefficients in order to make for ease in checking with other companies.

Recently an attempt was made to standardize on a pressure base of 14.73 lbs. per square inch, and our findings show that two-thirds of the companies interviewed are using this base, while most of the remaining contemplate a change in the future; however, in the Los Angeles Basin there are companies using 14.85 lbs. and 14.90 lbs.

Only two methods, so far as we were able to determine, are being used in the keeping of coefficients records, namely the loose leaf and card system. The former has the advantage over the latter only in the fact that it is larger, making it possible to record more information. Some companies are using different colored index cards to designate coefficients used on meters in some particular service, such as yellow cards for wet meters, blue for dry, etc. It seems advisable to show air coefficient, temperature and gravity corrections on record cards making it possible if any one of the three are changed, to use the others without again referring to a table.

Because of the widely varying conditions under which the various companies are operating it is realized that office practices can never be standardized. This paper does not recommend any particular method of keeping records, but it is hoped further steps will be taken to standardize on pressure base, method of calculating coefficients, dates used for corresponding charts, and pressure extensions.

Uses *for* Liquefied Petroleum Gas

(Continued from Page 70)

portance of these gases in the California gas industry depends entirely upon their relative cost compared with gases now in use. The cost data which have so far been presented in this paper apply only to the sale of liquefied gases in small cylinders for individual consumers. The price of the product sold in this manner has been too high to compete with manufactured gas, even in very small towns where the gas rates are comparatively high. The market for these bottled gases is therefore limited to isolated districts where manufactured gas is not obtainable and where the only competitive fuel is therefore electricity. The distribution of propane or butane through standard gas distribution systems is a proposition which has a much greater appeal to the gas industry than does the distribution of these gases in individual pressure containers. In the following paragraphs some of the economic factors governing the use of propane or butane in gas distribution systems will be briefly discussed.

As has already been pointed out, any natural gasoline absorption plant can produce a mixture of propane and butane without the addition of any special equipment, with the possible exception of accumulator tanks. If this mixture is not marketed as such, it is returned to the dry gas line where it mixes with natural gas and is either blown to the air or is sold to a gas distribution company at the prevailing wholesale rate for natural gas. Assuming a wholesale rate of 10 cents per M. c. f., the price obtained for propane marketed in this way is .08 cents per pound. It is, of course, not expected that any gasoline company will go to the trouble of marketing propane as such at a price even closely approaching this figure; however, if the material is purchased in wholesale quantities at the gasoline plant, it is reasonable to expect that a price considerably less than 1 cent per pound might be obtained. To my knowledge, the lowest price at which a mixture of propane and butane is now being purchased in California is approximately 1 cent per pound.

Since special equipment is required for their production, it is to be expected that commercially pure propane or butane will cost more than a mixture of the two. However, aside from the fact that slightly heavier storage containers are required for a mixture of propane and butane, than are required for pure butane, there seems to be no good reason for purchasing pure butane if the material is to be used for distribution through a gas distribution system and if the cost of such a product is higher than the cost of the mixture. A mixture of propane and butane can be vaporized at a central station without causing fractionation, by drawing liquid from the bottom of the tank and vaporizing this liquid in a small heat exchanger. In this way the composition of the liquid in the storage tank is kept constant and the heating value of the resulting gas is therefore constant.

The cost of transporting liquefied petroleum gases is a very important item. The Interstate Commerce Commission regulations require very elaborate and expensive tank cars for transporting this material and the freight rates are apparently a little higher than the prevailing rates for the transportation of casinghead gasoline. For example, the rate on butane from Saticoy to San Diego, a distance of approximately 200 miles, is 56 cents per 100 pounds.

If the quality of liquefied petroleum gases to be transported is sufficient to keep a large truck and trailer unit operating at least half the time, it can be assumed with sufficient accuracy for the purpose of this paper that the cost of transporting liquefied petroleum gases on the highway is 20 cents per 100 pounds per 100 miles. This cost will cover operating costs and fixed charges on the necessary investment.

The cost of storing and handling propane or butane at the city gas plant will depend upon whether the gas is to be distributed straight, or mixed with air. If a straight hydrocarbon is to be distributed the plant investment and plant operating costs will be very small. For example, the fixed charges and operating costs for a plant designed for a town of 10,000 population are estimated to be only $1,000 per year. Assuming an annual send-out of 1,340,000 pounds, the station handling costs will then be 0.0746 cents per pound.

If a carbureted air plant is used, the estimated annual fixed charges and operating costs for a plant of the same capacity as the one just described are estimated to be $5,000. The cost per pound of hydrocarbon sent out is 0.373 cents.

The cost of distributing either straight butane or carbureted air will probably not differ widely from the cost of distributing natural or manufactured gas. Distribution costs therefore need not enter into this study.

In table No. 4 the foregoing cost estimates have been compiled to show a comparison of the cost of gas produced from a propane-butane mixture and the cost of manufactured or natural gas in the holder ready for distribution.

Consider the case where 1 cent per pound is paid for the liquefied gas: These tables indicate that under the conditions assumed liquefied petroleum gases can be used in preference to natural gas only when the town under consideration is so far from a source of natural gas that the wholesale cost of the gas delivered at the town border exceeds 77 cents per M.c.f. However, the liquefied gases can be used in preference to 550 B.t.u. oil gas if the cost of this gas in the holders exceeds 39 cents per M.c.f. in case straight hydrocarbons are to be distributed, or 46 cents per M.c.f. in case carbureted air is to be distributed. This latter figure compares very favorably with the cost of producing oil gas by many California utilities during 1928, as Table No. 5 will indicate.

It is evident that in the case of many of those companies now operating small gas plants, the substitution of liquefied petroleum gases would result in a reduction of costs.

TABLE NO. 4

Price paid for liquefied gas c. per lb.	Transportation Costs c. per lb.	Handling and Storage Costs at Town Plant c. per lb.	Total Cost of gas ready for distribution c. per lb.	Equivalent Cost ($/M. C. F.) 1100 B.t.u. gas	500 B.t.u. gas
Case I: Town 200 miles from source of liquefied petroleum gases. Gas to be distributed without admixture of air.					
.50	.40	.075	.975	.512	.256
1.00	.40	.075	1.47	.772	.386
2.00	.40	.075	2.47	1.29	.645
Case II. Same as Case I except that a 550 B.t.u. gas air mixture is to be distributed.					
.50	.40	.37	1.27	.666	.333
1.00	.40	.37	1.77	.927	.463
2.00	.40	.37	2.77	1.45	.725

TABLE NO. 5

	Production* Expenses $ per M.C.F.	Estimated Fixed Charges $ per M.C.F.	Total Cost in the holder $ per M.C.F. made
Company A	0.49	0.10	0.59
Company B	0.78	0.10	0.88
Company C	0.99	0.10	1.09
Company D	1.000	0.10	1.10
Company E	.47	0.10	.57
Company F	.29	0.10	.39
Company G	0.27	0.10	0.37
Company H	0.61	0.10	0.71

*From California Railroad Commission statistics for 1928.

VI. Butane for standby

It has been proposed to use liquefied petroleum gases for standby purposes on natural gas systems which are fed through a single transmission line, and which are therefore subject to outages during stormy weather. A tank suitable for the storage of 1,359,000 pounds of pure butane, which is equivalent to 26,000,000 cubic feet of 1100 B.t.u. natural gas, can be built for approximately $25,000. The cost of providing storage for the equivalent amount of natural gas would be approximately $1,700,000.

It is entirely practical to provide sufficient butane storage in a town using natural gas, but now equipped with an oil gas plant, to make it possible to supply an 1100 B.t.u. mixture of oil gas and butane during a transmission line outage lasting several days. Because of this it is now possible to convert a town from oil gas to natural gas and insure a continuous supply of 1100 B.t.u. gas even though only one transmission line supplies the town.

Towns not provided with an oil gas plant can be provided with similar standby service by providing in addition to the storage tank the necessary equipment for mixing butane and air to give an 1100 B.t.u. gas.

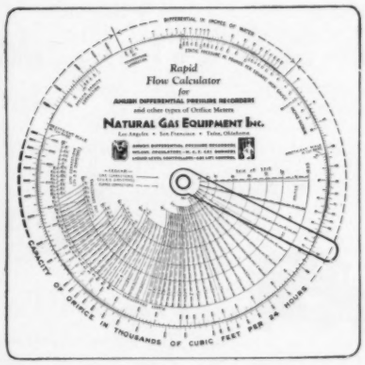


Illustration of rapid flow calculator introduced by Natural Gas Equipment, Inc.

Rapid Flow Calculator Offered *by* N.G.E. Co.

DETERMINATION of coefficient and volume, correct orifice size for any given volume, and differential pressure of gas flowing through a line, in connection with standard orifices and orifice meters, are made simple and speedy operations by a new calculator chart just released by Natural Gas Equipment, Inc. Results are indicated with sufficient accuracy for field requirements; or for rapid checking of closer computations where required for customers' accounts.

The illustration shows the form of the calculator. Complete directions for its operation are given on the jacket which is supplied for its protection, so that anyone can learn to make the necessary calculations with one or two trials.

The Rapid Flow Calculator was designed particularly for use with the Anubis Differential Pressure Recorder, but works equally well with any other type of standard orifice meter. The device was designed and is copyrighted by Natural Gas Equipment Inc., Petroleum Securities Building, Los Angeles. Copies will be supplied upon request made to the Los Angeles, San Francisco, or Tulsa offices of Natural Gas Equipment Inc.

R. W. HANSON MANAGER AT DALLAS FOR MERCO-NORDSTROM

R. W. Hanson has recently been appointed manager of the Dallas office of Merco-Nordstrom Valve Company, succeeding R. I. Mayorga, who has resigned to enter business for himself. Mr. Hanson comes to Dallas from El Paso, where he was associated with the American Smelting and Refining Company. Mr. Mayorga's term of office with the company, which maintains district offices in the Magnolia Building, ended the first of May.

CITIES SERVICE CO. EXECUTIVES VISIT BARTLESVILLE, OKLA.

Frank R. Coates, vice-president of Cities Service company, New York, and a member of the executive committee of the company, recently visited the offices of the Empire Companies at Bartlesville, accompanied by Virgil W. Miller, vice-president of the Central Union Trust Company of New York. H. R. Straight is vice-president and general manager of the Empire Companies.

NATURAL GAS UTILITIES BUYS DISTRIBUTION SYSTEMS

Natural gas distribution systems in Collinsville, Skiatook, and Sperry, Oklahoma, were recently taken over by the Natural Gas Utilities Company. These properties formerly operated as the Collinsville Gas Company, the Skiatook Service Company and the Sperry Service Company.

A. G. A. PUBLICATIONS LISTED IN PAMPHLET

"Publications of the American Gas Association—1930" is the title of a pamphlet issued by the A. G. A., listing several hundreds of individual publications of the Association, and giving prices at which they are available to members and non-members.

Central Butane Plant *at* Moorpark, California

(Continued from Page 69)

this fact was given due consideration. Low pressure distribution was adopted, welded construction used throughout, and the mains and services were thoroughly protected with a machine-applied and wrapped hot asphaltic coating. There are no threaded connections in the distribution system, with the exception of one in a cap on the top of a special welded fitting used in making service connections to the main, and those at the shut-off cock at the consumers' meters.

Shut-off cocks are used, lubricated with a special grease which will withstand the solvent action of the butane gas. All mains and services were laid with a 40-inch cover, to minimize the possibility of their being disturbed during street construction work.

A 75-pound pressure test was applied to the entire system for a period of three weeks before starting gas service. The gas is odorized to facilitate the detection of leaks. All meters in the town are read during a single day, so that an accurate comparison may be obtained between the total sales and the gas sent out through the master meter at the gas plant.

The gas rates in Moorpark are as follows:

Service charge—$1.25 per month
First 100 pounds @ 4c a lb.
All over 100 pounds @ 2c a lb.

Gas is measured to the consumer through standard gas meters, which have been equipped with a special index, geared so that when the volume of gas contained in one pound has passed through the meter, the index indicates one pound. The pound unit rather than the usual cubic foot unit was adopted so that residents of Moorpark, many of whom have been using liquefied petroleum gases in individual tanks, can readily compare the cost of the new service with that of the old.

An installation such as that at Moorpark can be installed for considerably less than could a system for the production and handling of a butane-air mixture. A saving in operating cost is also affected, since a straight butane system can be made entirely automatic and unattended, whereas an air-butane system requires the attendance of an operator.

We are confident that with a new distribution system designed especially for undiluted butane, the greater cost of leakage will not be sufficient to offset the savings affected by the low initial investment and low operating costs.

Mechanically, the Moorpark installation has operated very satisfactorily from the start. Whether or not such a project is economically sound can be determined only by operating for a considerable period.

PUBLICATION TREATS LARGE DIAMETER CAST IRON PIPE

The United States Pipe & Foundry Company, with general offices at Burlington, New Jersey, has brought from the press a publication on the subject of large diameter cast iron pipe.

ADVERTISING AGENCY OPENS IN LOS ANGELES

Bruce Daniels, who has been identified with industrial advertising for a number of lines serving the gas and related industries, has opened an advertising agency with offices in the Bendix Building, 12th and Maple Streets, Los Angeles.

SALES WRINKLES

"He Gains Wisdom in a Happy Way Who Gains it by Another's Experience" . . PLAUTUS

A Paint Job with Every Range

THERE is real buyer-appeal in a premium-offer which is held forth by the gas appliance salesmen at the Enid office of the Oklahoma Natural Gas Corporation. The Enid office offers the range buyer the option of receiving an allowance on her old stove, or of having her kitchen

"done over" at the gas company's expense. The company has a standing contract with a local paper hanger and painter to do the work, and, since no trade-in allowance is made when the kitchen is dressed up, the gas company breaks even . . . and the new range gets the right sort of introduction to the home.

In selling the painter and paper hanger on the idea of making a low rate for the work, it was pointed out that once an entry was secured to the home by way of the kitchen, other and more lucrative jobs would follow. And in order to avoid any ill-feeling which might result from poor work, the company was able to secure a guarantee of satisfaction with each job.

—Frank Osborn.

Make a Friend of the Milkman

SELLING gas refrigerators requires specific information which the salesman must have, but which he cannot afford to sacrifice too much time in securing.

He must know if the home has automatic refrigeration or not. If it has automatic refrigeration, what kind is it? And what condition is it in? The contributor of this "sales wrinkle" decided that the milkman was best qualified to supply the answer to these questions, inasmuch as his daily contact with the homes and the proper preservation of milk has made him naturally interested. In many cases as an added service the milkman not only delivers the milk but places it in the icebox. Consequently this

gas refrigerator salesman decided to enlist his aid. This was done by telling him about a refrigerator that made ice from heat, and—what was *most* important from his viewpoint—that automatic refrigeration doubled and trebled his sale of cream for frozen desserts. This thought made him "refrigerator-conscious" and he began to notice what kind of iceboxes he was putting the milk into. Often his customers give him advance notice of their intention to purchase automatic refrigeration; sometimes they ask his advice concerning which make to buy.

Here is the way milkman cooperation worked out for one salesman. Says Mr. Shell of Santa Monica, Calif.:

"Through the milkman's help, I know what homes have iceboxes and which have automatic refrigeration. In one instance he was able to give me a hot lead on customers who had just moved to my district and had no icebox. They told him they were going to buy an electric refrigerator. I called the next day, made an appointment in the gas company office, and later sold them a gas refrigerator.

"I am often able to recommend the milkman to new customers whom I have contacted through the sale of other appliances, and I am sure if the milkman is awake to the possibilities that he will and can give the salesman whole-hearted cooperation.

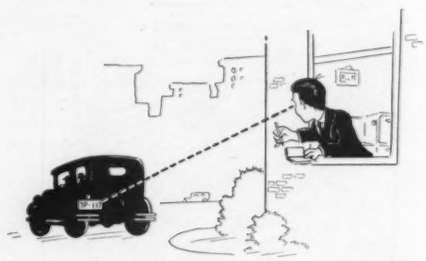
"This year I intend to supply the milkman with recipes for making ice cream in the gas refrigerator, which he can give to his customers and is bound to increase the sale of cream and also gas with which to freeze it."

—Frank S. Shell.

When the Prospect "Declines to State"

"THIS 'wrinkle' may smack of high pressure methods, but if used with discretion and plenty of tact, it can turn a *prospect lost* into a *sale made.*

"When all the well known methods of getting the prospect's name have failed, and the



wary, cautious shopper still avoids giving his name and address, it is my procedure, in order to get the name and address of such a prospect, to go outside with him, notice which automobile he gets into, and make a note of the license number. All that is necessary after this is to call the Division of Motor Vehicles and they will provide the necessary information.

"The follow-up man, of course, does not mention this procedure, but makes his call appear like an ordinary routine service call. Armed with a little advance information he is soon able to swing his talk around to the appliance in question, and possibly close a sale."

—Jack E. Wright.

Your "Sales Wrinkle" in Line for $10

WESTERN GAS has a standing offer of $10 apiece for every "sales wrinkle" which is selected for publication in this department. "Sales wrinkle" is just another name for the unusual idea which is being put to practical work for the salesman, anywhere in the gas industry, by company new business departments, appliance retail dealers, individual salesmen.

This month three tips of the livest sort are presented, contributed by:

Frank Osborn, Commercial Manager, Oklahoma Natural Gas Corporation, Enid, Okla.

Frank S. Shell, Southern Counties Gas Company, Santa Monica, Calif.

Jack E. Wright, Southern Counties Gas Company, Santa Monica, Calif.

"Wrinkles" should be addressed to WESTERN GAS at 124 West Fourth Street, Los Angeles, Salifornia.

SALES GAINS RECORDED IN BRITISH COLUMBIA

Gas appliance sales of the British Columbia Electric Power & Gas Company, Ltd., at Vancouver and New Westminster B. C., showed a material increase during the month of February, of this year, over the same month in 1929. Total appliance sales during February, 1930, amounted to $10,977.94, as compared with $8,748.35 during February of the previous year.

Selling *on a* 60-Month Payment Plan

By STERLING A. LIPSCOMBE
New Business Manager
Little Rock Gas and Fuel Company
Little Rock, Arkansas

GROUP appliance sales on a long-term payment plan is by no means a new idea, nor is our company the first to try it out. Cities Service Company has used it with great success both in gas and electric properties. It is, however, perhaps the first time the plan has been tried out in a newly acquired property—where gas was being turned into the mains of a town for the first time, and it is for this reason that it may create somewhat of an interest. We hold that our "60-month plan" will work in large or small properties, new or old, and we trust that the reader will agree with us.

There are three outstanding features in favor of this plan, set forth in the order of their importance: First, the securing of a maximum load quickly; second, leaving untouched the buying power and creating good will; third, effecting supervision and control of the type and kind of appliances sold. Taking these features up in the order named:

Securing a gas load quickly: Experience has taught every gas operator that when a customer's mind first turns, or is directed, to gas as a fuel, it is with the thought of using it for cooking purposes only, and that is just what happens under the old order of procedure. Why? First, because it requires a fair sum of money to pay for the service, the meter loop and outlet, the range, and oftentimes a meter deposit; and second, because the customer has not been educated to the proper use of gas for other purposes. The average cost to the customer, including the range, is around $100, and where terms of from six to 10 months are followed, it means that from $10 to $15 per month, plus the gas bill, is being paid. The general rule is to be content with this small load until the customer has paid up his contract and then sell him other appliances.

Following this rule we have sold the customer gas appliances "piece-meal" at a fearful loss of revenue, and over a period of four to five years. Not only that, but we have helped the customer take the line of least resistance in buying a minimum of heating appliances, oftentimes limited to one or two small space heaters—which we call the "huddle system of heating"—since it necessitates that the family huddle around in the one or two heated rooms.

Under the group selling on 60 months payment plan, the following conditions must be complied with in order to qualify:

A minimum purchase of a range, storage water heater, three heating appliances, or gas furance or conversion burner, and four outlets in different rooms. Where space heaters are used our representatives recommend, and in the majority of cases sell, at least one large space heater.

In our former method of piece-meal selling we were permitted to sell as often and as long as our customer fulfilled his former contracts. In other words, it was purely a matter of credit. Just so with your group selling, except the load is secured quickly, competition is eliminated and your customer made gas-minded in the beginning.

Leaving untouched the buying power and creating goodwill: A careful analysis of the buying power of the great middle class has revealed to us the fact that after the necessities (including, of course, the automobile) are deducted from the monthly earnings, there is left only about $15 per month buying power. Now, we hold that a company can prosper only in direct proportion to the prosperity of the community in which it operates, and that, if by aggressive selling it is able to take this entire buying power of the public, other merchants would suffer and ill will be created, and since it is not possible to take the entire buying power, consequently cheap and undesirable appliances in minimum quantities are purchased. Our company also holds that a satisfied customer is worth more than a few additional dollars, and that where cheap and inadequate appliances are purchased, unsatisfactory service results. It follows that the gas company is blamed for this poor service over which it had no control, or rather refused to exercise control in the beginning. Therefore, by bringing the payments within easy reach of the consumer, a two-fold purpose is accomplished: First, the best class of appliances, which are conducive to good service, can be sold, and second, a maximum of revenue can be procured immediately without hindering the even trend of every-day business.

DEVELOPING ARKANSAS' RESOURCES

Your Buying Power Untouched!

Now You Can Buy Modern Gas Appliances on A Small Monthly Payment Plan

Within the next few weeks, a representative will call at your home to help you get the most out of your fuel. He will be glad to give advice and suggestions. He is YOUR gas service man.

A New Service to Users of Gas

CITIES SERVICE COMPANY realizes that it can prosper only in direct proportion to the prosperity of the community it serves.

Therefore, in offering our customers modern and efficient gas appliances for a very small down payment and balance in small monthly payments with their gas bill, we hope to accomplish a twofold purpose—namely, to enable our customers to have the best in gas appliances, and to leave practically untouched their buying power.

As the success of other merchants depend upon the buying power of the public, and our success depends upon the community as a whole, we believe this arrangement will work to the mutual benefit of everyone concerned.

ARKANSAS NATURAL GAS CORPORATION

PHONE 150 415 MAIN

Advertising copy such as the above is used by Little Rock Gas and Fuel Company to feature long term gas appliance payment plans.

A supervision and control of the type and kind of appliances sold: We believe the readers will agree that the most important factor in successful gas operating is proper, adequate and satisfactory appliances. We have found in the opening of new properties, and as far as that is concerned in the old properties, that the department stores, hardware stores, furniture stores are selling appliances about which they have limited knowledge, handling lines with the principal idea of showing a profit. This type of selling is often conducive to the sale of the cheapest and most inadequate type of gas appliances—to their installation without proper care or thought given to proper adjustment and regulation. Under the group and 60 months selling plan, we can sell the highest type and grade of appliances and at the same time eliminate cheap competition. In following through this plan special care is given to installing, regulating and servicing. Competent and thoroughly trained men see that the appliance gives a maximum of service and satisfaction, again proving the axiom "if you want a thing well done, do it yourself."

The reader will, no doubt, be anxious to know something of the results of our first effort in a property where gas was first introduced. We take for this example Stuttgart, Arkansas, a town of approximately 7,000 people, no better and no worse than any town of its size in the country. The first 15 days found us with 74 meters connected and appliance sales of $7,317, and in the three months operations to date, the average sale per month per meter has been around $80. What of the revenue? As compared with Little Rock where gas has been used for 19 years, Stuttgart in the three months' operation thus far shows a 100 per cent greater consumption domestically and has added on customers at the rate of 600 per year—which under the old plan would have required three years. This showing, moreover, was made at the end of our winter months.

In conclusion, let us say that we are thoroughly satisfied that the keen, alert gas executive can shoot this plan full of holes, but we would warn them that more attention must be given to results and less attention to cost until we have brought ourselves along side of our wide-awake, aggressive competitors, and until we have made the public as much gas-minded as they are at the present time electric-minded, and until we have overcome an hundred years of sleeping sickness in gas operating and revenue building.

DETROIT, MICHIGAN, STOVE CO. MOVES DALLAS OFFICE

The Detroit-Michigan Stove Sales Company recently removed its Dallas, Texas, office to the 10th floor in the second unit of the Santa Fe Building. Jack M. Little is district manager.

BLAINE, WASH., FRANCHISE ASKED BY NAT. GAS CORP.

The Natural Gas Corporation, a Washington company, through its attorneys, Williamson, Wallace & Vaughan of San Francisco, has made application for a franchise to lay gas mains in the streets of the border town of Blaine, Wash.

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

(Continued from Page 60)

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
TEXAS (Continued).					
Houston Pipe Line Co.	Main line to Angleton	10.9	4 and 2	Completed, 1929	.....
Lone Star Gas Co.	To serve Hamilton, Whitney, etc., in central Texas	100+	6 and 4	Completed, 1929	.....
Lone Star Gas Co.	Petrolia to Forth Worth and Dallas	120+	20	Completed, 1929	.....
Lone Star Gas Co.	Dallas to Athens	67	8 and 6	Completed, 1929	.....
Lone Star Gas Co.	Paris to Clarksville	33	8 and 6	Completed, 1929	.....
Lone Star Gas Co.	Desdemona to Sipe Springs	24	16	Completed, 1929	.....
Lone Star Gas Co.	Paris to Hugo	24	6 and 8	Completed, 1929	.....
Lone Star Gas Co.	Abilene to Lawn, etc.	21	4	Completed, 1929	.....
Lone Star Gas Co.	Gainesville to St. Jo, etc.	20	4	Completed, 1929	.....
Lone Star Gas Co.	Ranger to Moran	20	12	Completed, 1929	.....
Lone Star Gas Co.	Eddy to Rosebud	20	6 and 4	Completed, 1929	.....
Lone Star Gas Co.	Fox field to Palacine field in Stephens County, Oklahoma	10	12	Completed, 1929	.....
Lone Star Gas Co.	To Pueblo Gasoline Plant	6	12	Completed, 1929	.....
Lone Star Gas Co.	Gainesville Junction to gasoline plant	4	10	Completed, 1929	.....
Lone Star Gas Co.	To Brad Compressor Station (discharge line)	6	12	In progress	.....
Lone Star Gas Co.	To Pueblo Plant, (field line)	6	10	In progress	.....
Lone Star Gas Co.	To Jack County, (field line)	14	6	In progress	.....
Lone Star Gas Co.	From Amarillo field, Texas to Omaha and Council Bluffs etc.	590 (Approx.)	24, 22, 20	Proposed	.....
Southwest Gas Co.	Luling, to Darst Creek to supply gas for drilling purposes	10	..	Proposed	10,000
Texas Gas Utilities Co.	From Rycade field in Maverick County to point N. E. of Del Rio	60	10	Projected	.....
United Gas Co.	Huffman to Barbers Hill, South Liberty Field, Liberty and Dayton	18.40 15.43 3.01	8 6 4	Completed, 1929	.....
United Gas Co.	Converse Junction to Republic Portland Cement Co.	5.16 2.56	12 6	Completed, 1929	.....
United Gas Co.	Converse Junction South to Kenedy	59.96	16	Completed, 1929	.....
United Gas Co.	From Kenedy to Yorktown	20.58	8	Completed, 1929	.....
United Gas Co.	Tapping off above two lines	5.75 16.16	6 4	Completed, 1929	.....
United Gas Co.	From Southern Gas Co. 8 inch line near Berge to Elmendorf and Saspamco	11.98 .48	6 4	Completed, 1929	.....
United Gas Co.	From Southern Gas Co. Cole field line to Duval, Texas, Sulphur Co.	4.09 17.14	6 4	Completed, 1929	.....
United Gas Co.	From Agua Dulce field to Magnolia Co. line at Orange Grove	17.06	12	Completed, 1929	.....
United Gas Co.	From Dixie Gulf 16 inch line near Crosby to Baytown	15.69	12	Completed, 1929	.....
United Gas Co.	From Magnolia Co. line to 10 inch Kenedy-Converse Junction line	6.38	12	Completed, 1929	.....
United Gas Co.	From Magnolia line to Pettus field	5.62	4	Completed, 1929	.....
United Gas Co.	From Jennings field in Zapata County, to Monterrey, Mexico	143.34	12	Completed, 1929	.....
United Gas Co.	From end of the Southern Gas Co. line in Cole-Bruni field to Jennings field	12.30	10	Completed, 1929	.....
United Gas Co.	Bruni to New Braunfels	203	14, 18 and 20	Completed, 1929	.....
United Gas Co.	Bruni gathering and tap lines	31	12, 14 and 18	Completed, 1929	.....
Cities Service Gas Co.	Amarillo field in Carson County, Texas, (Gathering system extensions)	4.3 6.5 1.6 3.6	16 12 8 6	Completed, 1929	322,735
Public Service Corp. of Texas	Wheeler County fields to Mobeetie, Laketon, Miami	35	4	Completed, 1929	.....

Seen on the Natural

(Continued

the 43-mile extension are Wasco, Delano, Shafter and McFarland. Approximately $325,000 will be spent on the development. Other projects of lesser importance added over 75 miles to the company's lines during the year.

Southern Counties Gas Company extended its system north to Gaviota, laying about 33 miles of main. At Gaviota the Southern Counties lines join those of the Santa Maria Gas Company. Another Southern Counties extension took natural gas to the towns of Laguna and San Clemente in the southern part of the state, the line continuing to the boundary of San Diego County.

Santa Maria Gas Company added approximately 80 miles of line, extending its system from Gaviota to Paso Robles.

Coast Counties Gas and Electric Company during 1929 brought "natural" service to about a dozen California towns, among them Santa Cruz, and Watsonville. Pacific Gas and Electric Company's main line supplied the gas, which was served through over 50 miles of laterals constructed by Coast Counties. A line was also taken to Danville, Baypoint, Walnut Creek, and other communities from the company's Richmond-Pittsburg line. Plans for adding approximately 200 miles of mains from the new Standard-Pacific carrier have been announced by Coast Counties, to cost more than a million dollars.

Accompanying the spread of natural gas service on the West Coast, there has been in recent months a corresponding activity in the development of liquefied petroleum gas markets. Considerable franchising activity looking toward service of gas through butane plants has been registered in Washington and Oregon, as well as California.

"NATURAL" FOR NEBRASKA

Towns in central and southern Nebraska are also looming up as profitable gas markets with lines in two instances going north from Kansas into Nebraska, and a third line just announced. A Cities Service line was recently completed into Falls City and plans have just been announced by the company for the construction of a line extending north as far as Superior, Nebraska.

Resulting from the Nebraska activity, has been the forming of two affiliated companies, the Nebraska Pipe Line Company and the Nebraska Natural Gas Company of Lincoln. Clement L. Studebaker of Chicago is president of the Pipe Line Company, which is incorporated for $1,500,000. The Nebraska Natural, a distribution company, has franchises in 20 or more communities.

Several groups of interests are still bidding for the Omaha franchise, which will probably come before the polls for voting some time in July.

UNITED GAS COMPANY

Of exceptional interest to the gas industry is the recent merger bringing under one control the United Gas Company of Houston and the natural gas properties of Electric Power & Light, an Electric Bond and Share interest. The new company will operate under the name of the United Gas Corporation.

Gas Horizon

from Page 60)

Merged with these interests is the Magnolia Gas Company, purchased for a consideration said to be $47,250,000.

Magnolia Gas Company was a subsidiary of Magnolia Petroleum Company of Dallas. The company was organized in 1924, at which time it constructed a 225-mile line from Sarepta in North Louisiana to Port Arthur. In 1927 it constructed a line from Latex to Dallas and Forth Worth. In 1928-29 it extended its original line from Sarepta 105 miles to Alto in the Richland Parish Louisiana field, thereby practically doubling the available gas supply for the Magnolia system. During the same period it also looped its line from Sarepta station to Latex a distance of 55 miles. Last year this company constructed a 203-mile 14-, 18- and 20-inch line from the Bruni fields to New Braunfels.

United Gas Company, under Moody-Seagraves management was chartered in May, 1928, as a public utility investment and management company.

In east, south, and southwest Texas, the United interests serve, directly or indirectly, San Antonio, Houston, Austin, Laredo, Beaumont, Port Arthur, Palestine and Marshall. These are the larger cities among the 58 cities and towns, which the company serves in Texas. In addition it sells gas at wholesale to local distributing companies in six other Texas towns. As of January 1, 1930, the company's system totaled 3,240 miles of transmission, distributing and gathering lines.

The Cia. Mexicana de Gas, S. A. operates the Mexican division of the gas line recently constructed by the United Gas interests to Monterrey, Mexico. The line originates in the Jennings gas field in Zapata County, Texas, and extends a total distance of 143.34 miles. Construction was commenced on the line in late July of last year and brought to completion around the 1st of December. The line is of 12¾-inch pipe.

In addition to directly controlled companies, the United Gas Company also owns a substantial interest in the capital stock of the Mississippi River Fuel Corporation which is now supplying industrial gas in St. Louis and environs. It also has a substantial interest in the Consolidated Gas Utilities Company operating from Oklahoma City. This company supplies gas at wholesale or retail in more than 50 towns in western and northern Oklahoma and in south central and southeastern Kansas.

The United also has a considerable capital stock investment in Natural Gas Securities Corporation, which controls El Paso Natural Gas Company. This company last May completed a 209-mile 16-inch gas line from the Lea County, New Mexico field to El Paso. Through direct control and through investments in other companies, the United Gas Company is interested in a net-work embodying more than 5,390 miles of pipe line. O. R. Seagraves is president of the United Gas Company.

LOUISIANA GAS & FUEL

The Louisiana Gas & Fuel Company, a subsidiary of Electric Power & Light Corp. was organized about a year ago as a wholesale distributing company, through the consolidation of a number of gas producing companies in the Monroe and Richland fields. Among those which make up the Louisiana Gas & Fuel Company are the Palmer Corporation, of Louisiana, Louisiana Gas Company, Industrial Gas Company, Natural Gas Producing Company, of Louisiana, Morehouse Natural Gas Company, Southern Gas & Fuel Company, U. S. Carbon Company, Panola Oil & Gas Company, Excelsior Pipe Line Company, Northern Louisiana Natural Gas Company, Ouchita Natural Gas Company, Southern Gas Company, Latex Construction Company and Frank A. Reid interests.

N. C. McGowen is president of the Louisiana Gas & Fuel Company.

Some of the largest gas projects yet to be undertaken originate as to source of gas supply in the Monroe and Richland fields in north Louisiana. Last year witnessed the completion of the Mississippi River Fuel Corporation industrial line from Monroe to St. Louis and the Southern Natural Gas Corporation's line from the north Louisiana fields to Birmingham and Atlanta. Both of these lines are steadily increasing their industrial load.

The actual construction of the St. Louis line was begun on April 22 and was completed six and one-half months later, during the first part of November.

Companies owning the outstanding stock in the Mississippi River Fuel Corporation are Standard Oil of New Jersey, Electric Power & Light Company (Electric Bond & Share), Columbian Carbon Company, United Carbon Company, Palmer Corp., and United Gas Company. Christy Payne is president of the fuel corporation.

The line which these interests constructed is 526 miles in length, the main line being of 22-inch pipe. Five compressor plants were constructed on the line. Ford, Bacon & Davis had the general contract for the line, with Williams Brothers of Tulsa and Oklahoma Contracting Company of Dallas, the sub-contractors.

The Mississippi River Fuel Corporation is selling gas directly to many industries and also supplies gas in the St. Louis area to the Missouri Industrial Gas Company, affiliated with Laclede Gas Light Company, and to Cahokia Manufacturers Gas Company, affiliated with the Illinois Power & Light Company, which in turn supplies gas to various industries on its lines.

Gas from the line is also being distributed for both domestic and industrial uses in a number of towns in Arkansas and Missouri along the route of the line.

SOUTHERN NATURAL'S LINE

Construction on the Southern Natural Gas Corporation's line from the Monroe and Richland fields, across Mississippi and Alabama to Atlanta, Georgia, was begun in May, 1929. Delivery of gas was made at Birmingham, Ala., before December 31, and at Atlanta, Ga., around January 25. The main line, except at river crossings, was 22-inches in diameter as far as Birmingham and 20 inches in diameter from that point to Atlanta. The total mileage laid was 909.

Two compresser stations have been erected on the line for immediate needs, one of them being at Perryville, La., and the other at Reform in Pickens County, Alabama. The total cost of the project was approximately $25,000,000.

J. H. White is president of Southern Natural which is operated under Ford, Bacon & Davis management. Edgar G. Hill of the latter organization is vice-president and general manager of the company. Oklahoma Contracting Company and Williams Brothers had the contract on the first 100 miles of the line. Oklahoma Contracting Company, Hope Engineering Company and Williams Brothers were given the contract for the balance of the line.

ARKANSAS NATURAL EXPANSION

Arkansas Natural Gas Corporation, a Cities Service Company organized in April 1928, during the past year has fortified its position through the construction of a 137-mile 20-inch line from the Monroe fields to Shreveport, where it makes connection with the Shreveport-to-Little Rock main line. Construction was begun on this line in May of last year and was completed around November first.

A compressor plant was constructed on this line at Sterlington, 20 miles from Monroe.

GAS TRANSMISSION LINE CONSTRUCTION IN WESTERN AMERICA—1929-1930

Company	Line Location	Length (Miles)	Size (Inches)	Status	Cost
Public Service Corp. of Texas	Wheeler County field to Canadian, Perryton, Spearman	106	6	Completed, 1929	.....
Public Service Corp. of Texas	Perryton to Follett	40	4	Proposed	.....
Public Service Corp. of Texas	Point on line near Canadian to town of Supply, Oklahoma	59	6	Completed, 1929 and 1930	.....
Southern Union Gas Co. of Texas	From Racoon Bend field to Brenham	18	5	Completed, 1929	.....
Southern Union Gas Co. of Texas	Racoon Bend field to Hempstead and Navasota	60	5	Completed, 1929	.....
Southern Union Gas Co. of Texas	Winkler County field to Wink, Pyote, Pecos, etc.	65	5½	Completed, 1929	.....
Moran Corp.	From White Point to Ingleside, Aransas Pass, Gregory, Portland and La Quinta	20 (Approx.)	..	Completed, 1929	.....
WASHINGTON					
Northwestern Natural Gas Co.	Benton County gas field to Sunnyside	25	6	Completed, 1929	.....
Northwestern Natural Gas Co.	Laterals from above line to Prosser and Grandview	30	4	Completed, 1929	.....

The CERAMIC INDUSTRY *finds new profit in using* DFC Atmospheric Gas Burners

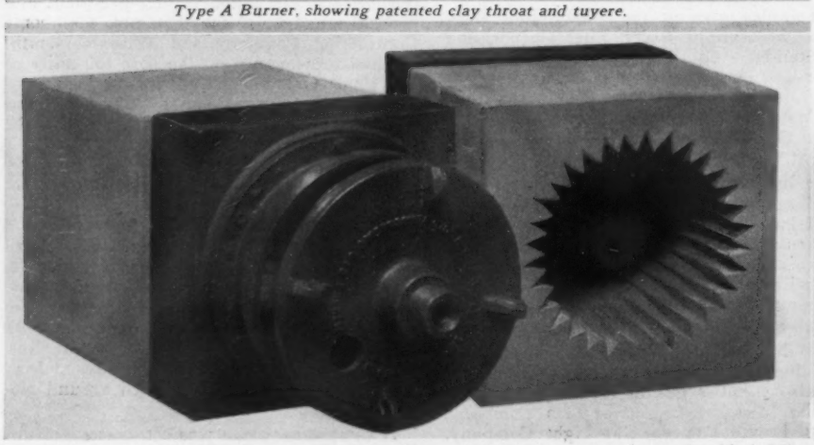
HERE is a GIANT AMONG INDUSTRIES in the consumption of natural gas—dwarfing even food manufacture and iron and steel. Every brick plant, terra cotta manufacturer, tile works, or maker of other clay products can be made a splendid gas customer. In using the DFC Atmospheric Gas Burner, the manufacturer is serving his own best interests. Gas firing gives him equal or better results at less fuel cost. And from the standpoint of the gas industry, the ceramist is an ideal customer, adding off-peak loads in great volume.

The DFC Atmospheric Gas Burner, over a wide range of installations in the ceramic industry, has a proved record of these and other advantages: (1) less gas per ton of ware, (2) positive, simplified flame control, (3) a flame that won't blow out, and (4) withstands severe service temperatures without deterioration of any part.

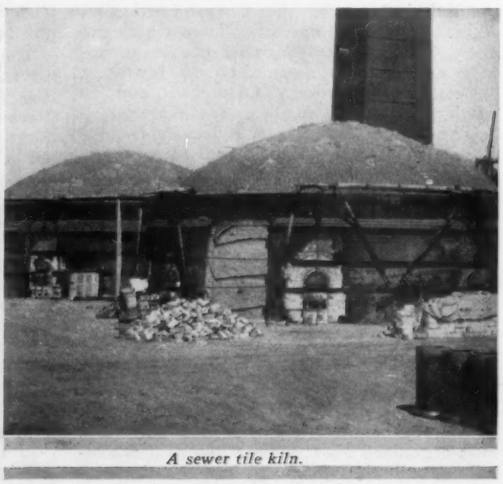
Flame won't blow out, even at gas pressures as high as 35 pounds per square inch!

Uncanny performance ability is largely the result of a patented clay throat carrying a series of longitudinal ridges which become incandescent in service. This secures more efficient combustion and permits higher velocities of the mixture, holding the flame back to the throat under all pressures, and giving the operator higher temperatures than he could get with ordinary equipment except at excessive costs.

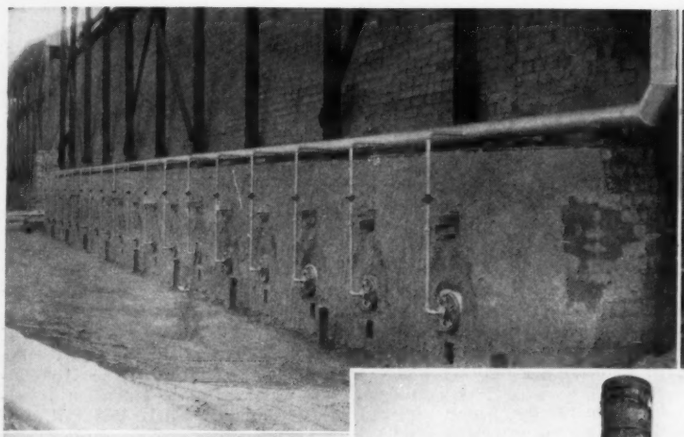
The DFC line of burners includes both blast and atmospheric types and offers a wide range of sizes and designs



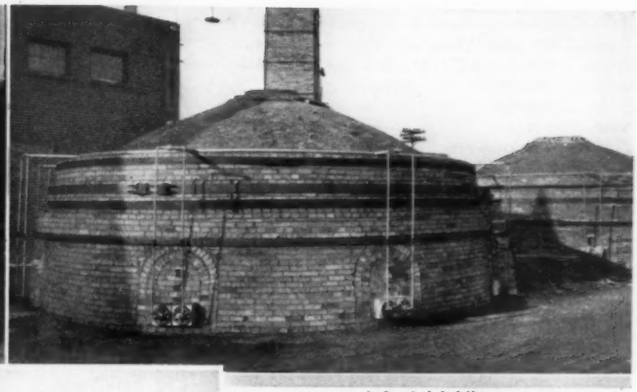
Type A Burner, showing patented clay throat and tuyere.



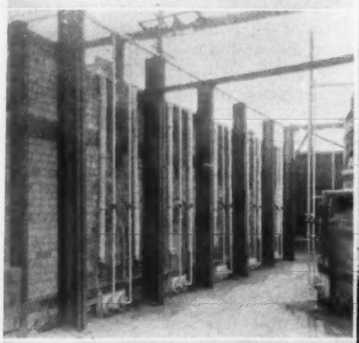
A sewer tile kiln.



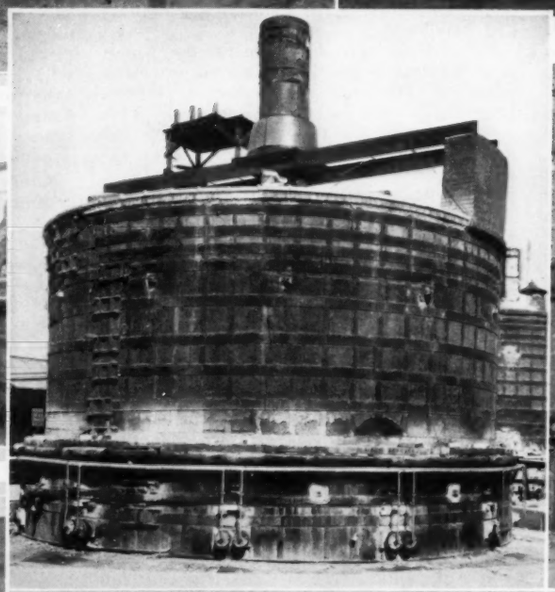
A building brick kiln.



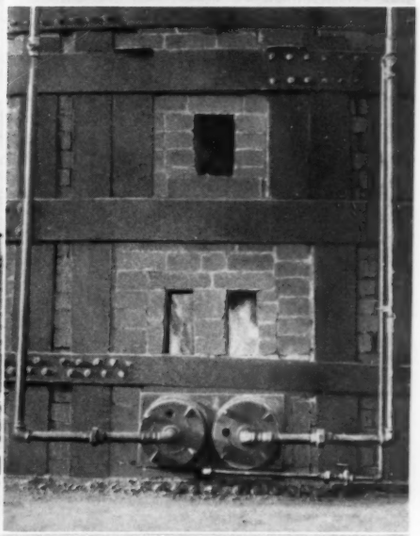
A fire brick kiln.



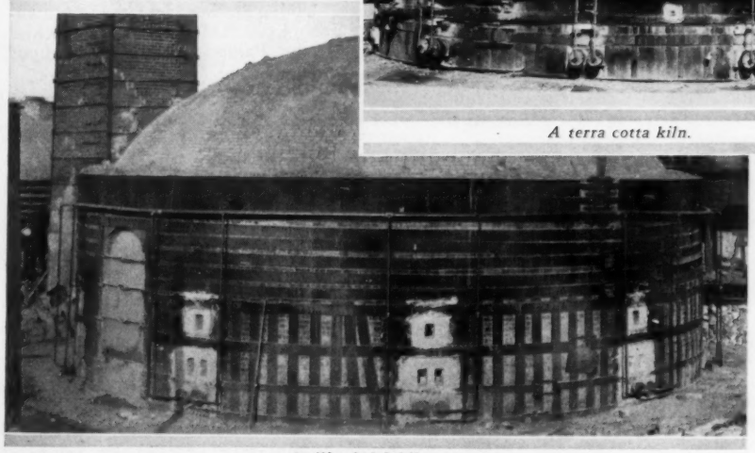
A crucible kiln.



A terra cotta kiln.



Installation is simple.



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THE DENVER FIRE CLAY COMPANY

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BRANCHES AT SALT LAKE CITY, EL PASO, AND NEW YORK

At Waskom connection is made with the Dixie Gulf Gas Company line serving eastern and Southern Texas, and gas is supplied under contract to this company.

At about the same time that construction was begun on the 20-inch line, Arkansas Natural announced the purchase of a 16-inch line constructed by the Hunter interests and the 12- and 14-inch line constructed by the Latex Construction Company, connecting the Monroe field to El Dorado and Camden, Arkansas. This purchase was made from the Industrial Gas Company. This line has now been extended to connect with the main line of the company from Shreveport to Little Rock at a point near Emmett, Ark.

The distribution system and franchise at El Dorado has also been purchased from the Industrial Gas Company by the Public Utilities Corporation of Arkansas, subsidiary to Arkansas Natural.

The construction of this new line establishes for Arkansas Natural a connection with gas fields in East Texas, gas areas near Shreveport, Monroe and Richland, Louisiana, and El Dorado, and Clarksville, Ark.

Another extension of the company has been westward to towns in east Texas. These towns are served through an 8-, 6- and 4-inch line that taps the Shreveport-to-Little Rock main line at a point near Rogers. The terminus of the main line is Pittsburg, Texas, with laterals being constructed to adjacent towns.

Approximately 130 miles of line make up this extension to east Texas. Fifty miles of this is 8-inch and the remainder 6- and 4-inch. The line was constructed by the Arkansas-Louisiana Pipe Line Company, a subsidiary, and distribution in the east Texas towns will be through the Southern Cities Distributing Company, the retail agency of the Arkansas Natural.

An important item in this company's program during 1929 was the purchase of the Little Rock Gas & Fuel Company from the Dawes interests.

A project being watched with interest in Louisiana is the contemplated construction of a gas line to serve towns in the southern part of the State. City officials in these towns within recent months have instituted a movement to bring natural gas to their communities, through conferring with prospective pipe line companies and through building public interest among their citizens on behalf of gas for their homes.

The enterprising towns behind this plan are Lake Charles, Lafayette, De Ridder, Morgan City, Welsh, Marksville, Eunice, Abbeville, Crowley, De Quincey, Opelousas, Rayne, Baldwin, New Iberia and Jennings. Other towns, among them Lecompte, Cheneyville, Bunkie, Glenmora, Elizabeth, Leesville, Ville Platte, Estherwood, Lake Arthur, Roanoke, Lacassine, Duson, Scott, Broussard, Erath, St. Martinville, Jeannerette, Franklin, Patterson and Berwick, will be served along the route of proposed lines to this section.

The Arkansas Natural Gas Company and the Southern Gas Line, Inc., of Monroe, both submitted proposals for supplying gas service to the towns. However, it is understood that both have practically withdrawn their offers since the merger of United Gas, Magnolia Gas and Electric Power & Light, for the 20-inch main line of the Magnolia to Beaumont provides a nearer source of supply than that offered through the other companies, according to report.

A development likely to be announced during the coming year, is one that will enlarge the facilities of the Interstate Natural Gas Company for supplying gas to New Orleans. The Interstate's 22-inch line originating in the Monroe fields has already been looped for a short distance. The coming year will probably see additional sections of this line looped, so as to care for increasing gas demands at New Orleans. There has been talk also of extending this line to Mobile. Other interests have mentioned a project which would go direct to Mobile, Ala., Gulfport and Biloxi, Miss., from the Monroe fields.

In connection with the Monroe fields, it is interesting to note the development along another major line which feeds from this section. The Memphis Natural Gas Company completed its 212-mile 18-inch line from the Monroe fields to Memphis late in 1928. The line was primarily built to serve Memphis, but during the year and a half of its operation, gas has been carried to numerous towns on its route, in Louisiana, Arkansas and Mississippi.

By way of new development, the Memphis Natural is contemplating an extension north of Memphis to Covington, Ripley, Dyersburg, and Jackson, Tennessee. This program calls for the construction of 160 miles of line, 40 miles of which will be 12-inch, 40 of 10-, 40 of 8-, and about 20 of 6-inch pipe.

MO.-KAN. PIPE LINE CO.

Another company said to be contemplating activity in the Tennessee area is the Missouri-Kansas Pipe Line Company, which is understood to be giving consideration to the constructon of a line from Kentucky fields to Nashville, Tenn.

This company, which has headquarters in Kansas City, began operations in May, 1928, with approximately 113 miles of pipe line in Missouri and Kansas. Since that time the company has increased its system several times over. It now operates gas system in Missouri, Kansas, Kentucky, Illinois, and has recently effected an entrance into Indiana, through plans for the construction of a gas line northward from Kentucky fields across the Ohio River to Cannelton and Tell City, in Indiana. The company recently was granted franchises at these points.

Among the principal customers of the company are the American Pipe Line Co., Cities Service Gas Co., Oklahoma Natural Gas Corp., Prairie Pipe Line Co., Midwest Gas Co., Union Gas Corp., and Owensboro Gas Co.

The name of this company has also in recent months been associated with a project to pipe gas to Omaha. In this connection, the company is understood to have underway a survey for an 800-mile, 24-inch gas line from Texas gas fields to Minneapolis and St. Paul, Minn. This carrier would serve Omaha and other important cities in Nebraska and Iowa. Brokaw, Dixon, Garner and McKee, a New York engineering firm, is conducting the survey.

Kansas has seen an unusually great expansion program over the past year. The tabulations which appear in these pages chart a total of 674 miles of line completed in 1929. Most of this line ranges 8 inches in diameter and less, with here and there a unit of 10-, 12-, 16- or 20-inch pipe.

CITIES SERVICE PROGRAM

The Cities Service Gas Company, gas subsidiary of the Empire Companies, with headquarters at Bartlesville, has been a leader in this expansion activity, with 293.5 miles of gas transmission lines constructed in 1929, and another 395.5 to date in 1930.

One of the largest units in this company's program is a 73-mile, 10-inch line from the company's line south of Joplin, Missouri, extending east to Springfield. This line was completed late in the summer of 1929.

Cities Service also took a line north to Nebraska in 1929 and was one of the first companies to supply natural gas to towns in that State. The Nebraska line was a 53-mile extension north from the company's line at Atchison, Kansas, to Falls City, Nebraska. The main line extension was completed in December, 1929.

The Gas Service Company is the distribution company affiliated with the Cities Service.

A project which Cities Service has just announced is the construction of an 8-inch line from Lyons, Kansas, to Superior, Nebraska, a distance of 116 miles. The line will pass through Ellsworth, Beloit, and Mankato, in Kansas, and thence to Superior.

The Oklahoma Contracting Company of Dallas has been awarded the contract for the line, which is an extension of the Hutchinson-to-Lyons carrier. The extension is expected to be completed early this fall, and will be a welded line. The project also calls for the construction of two compressor stations. Total mileage planned, including branch lines of 4-, 3-, and 2-inch pipe, is approximately 230 miles.

Cities Service now has under construction a 50-mile extension of its 20-inch line to extend from about 15 miles south of Perry, Okla., to the Oklahoma City field, where the company has large holdings. This line makes a connection with a line completed in 1929 from the Dilworth compressor station in Kay county, northern Oklahoma, to a point south of Perry. This extension was about 75 miles in length, including branch lines into the Lovell and Roxana gas fields of Logan County, Okla.

Among compressor stations built by Cities Service Gas in connection with line extensions discussed, two of the larger are the Matfield Green Station on the Ottawa-Wichita line (4,000 B.H.P.) and the Wichita Station, on the Pampa-Wichita line (1,000 B.H.P.).

The Argus Gas Company with headquarters at Dodge City, Kansas, added approximately 150 miles to the Kansas total for 1929.

Kansas Pipe Line & Gas Company, Salina, Kansas, subsidiary of the North American Light & Power Company, has had a large part in Kansas gas extensions of late. The company began operation in 1926. At this time it constructed an 8-inch line from the McPherson, Kansas, gas field, which had just been brought in, to Salina, Kansas. Later this was extended to Abilene, Junction City, Fort Riley, Manhattan and Hutchison. New fields were tapped as the system grew. Last year this company constructed gas lines amounting to approximately 350 miles.

Another important unit in its construction program is a 53-mile 8-inch line from Lewis to Nashville, Kansas. At Nashville the line ties in to the 16-inch line of the company from the Medicine Lodge field to Grand Island, Nebraska.

The North American Light & Power Company, during the past year, purchased the common stock of the Midwest Telephone & Power Company, owners of the Western Gas Company, and of the Western Pipe Line & Gas Company, an affiliated company.

The Western Gas Company began activity in January, 1929, and serves gas in Ellinwood, Great Bend, Hoisington, Otis, Olmitz, Bison, La Crosse, Victoria, Walker, Gorham, Larned and other Kansas towns.

Another active Kansas Company is the Public Service Company of Kansas with headquarters at Pratt. In 1929 this company completed approximately 75 miles of transmission line in sizes mainly 8 inches and less. The line which originates in the Watchorn field in Clark county, Kansas,

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That its goal is to have every hotel and restaurant kitchen within the reach of a gas main, using gas the modern fuel for all cooking operations.

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OKLAHOMA DEVELOPMENT

Oklahoma last year witnessed its greatest year in gas expansion activities, with approximately 700 miles of gas transmission line being constructed within the state, bringing the total mileage to nearly 7,000 miles.

E. F. McKay, manager of the Oklahoma Utilities Association, stated in a recent annual report, that 41 towns within the state granted franchises last year, and that a total of 36 towns received gas distribution service. This brings the total number of towns now using gas within the state to about 300.

Towns receiving gas for the first time last year are Harrah, Jones, Spencer, Choctaw, Nicoma Park, McLoud, Hammon, Manitou, Madill, Tishomingo, Alex, Quinlan, Avard, Mountain View, Woodward, Mooreland, Cherokee, Waynoka, Alva, Fort Cobb, Carnegie, Forgan, Beaver, Mountain Park, Snyder, Keys, Muldrow, Hugo, Maysville, Tyrone, Hooker, Baker, Crowder, Floris and Turpin.

Sixty-seven of the 77 counties of the state are reached with natural gas according to O. D. Hall, assistant manager of the Oklahoma Utilities Association, and more than 80 natural gas utility companies are operating in the State.

The Winchester Oil & Gas Company is credited with constructing the longest gas line within the State during 1929. This line feeds in the Barber County gas fields near Pratt, Kansas, extending southward 128 miles to serve Alva, Waynoka, Avard, Quinlan, Cherokee, Mooreland, and Woodward, Oklahoma. The line is of 6-inch pipe.

The State Fuel & Supply Company, which serves about 20 towns in Oklahoma, constructed about 50 miles of gas transmission line in 1929. The principal unit in its program was an extension westward from Anadarko to Carnegie, Fort Cobb and Mountain View. These towns were among those which received gas during the year.

The Oklahoma Natural Gas Corporation has announced the immediate construction of a 16-inch line from the Quinton gas field in southeastern Oklahoma to connect with the company's system near Muskogee. Cost of this line is estimated at $1,000,000 and is part of a program calling for the expenditure of $5,000,000 for the present year. About $500,000 will be spent on its system in and adjoining Oklahoma City.

A connection was recently made by the company with the Oklahoma City oil and gas field through an extension constructed from a point on the main transmission line at Oklahoma City to the fields. A second connection was made with the field through a 7-mile 6-inch line constructed from its main system southwest of Oklahoma City eastward to the field.

The Oklahoma Natural has also recently constructed 12 miles of 8-inch line from the Keefeton field into Muskogee. A 26-mile line was also constructed from a point on the company's system near Ardmore to connect with a new line constructed by the Standard Gas Company. The latter company which piped Madill and Tishomingo during the past year constructed 15 miles of line connecting with the Oklahoma Natural extension, which affords the supply of gas for the two towns.

Two gas companies organized in Oklahoma during the past year are the Industrial Gas Company, formed to supply gas from the Oklahoma City field to industries and towns near the city, and the Pioneer Gas Utilities Company. This latter company recently has completed about 40 miles of gas main extending from the South Oklahoma City field to McLoud. A number of domestic and industrial consumers outside of the area supplied by the Oklahoma Natural, which has the Oklahoma City franchise, have been served by this system; and also the towns of Nicoma Park, Choctaw, Harrah, Jones, Spencer, McLoud and Nichols Hills. Distribution systems at these points were completed during the last year. The Pioneer Gas Utilities Company is a subsidiary of the Southern Union Gas Company of Dallas.

Another Dallas company operating in Oklahoma is the Community Natural Gas Company, an affiliated organization of Lone Star. The Lone Star Gas Company constructed an extension from its line serving Frederick and Tipton, Oklahoma, to Snyder, Manitou and Mountain Park, where the Community constructed distribution systems.

The Community serves about 25 towns in Oklahoma and about 200 towns in Texas.

The Consolidated Gas Utilities Company with headquarters at Oklahoma City constructed approximately 50 miles of gas system in 1929 with gas service supplied to four towns within the state during the year. This company supplies gas at wholesale to about 25 towns and serves at retail around 30 towns in Oklahoma and Kansas. The gas supply for the company is drawn from the Texas Panhandle.

The Central States Power & Light Corp. recently purchased the Western Counties Gas Company, serving eight towns in western Oklahoma. Following the purchase these towns have been connected to the Central States system centering about Elk City.

Work is reported to have begun on a proposed line of the Northwest Texas Gas Company which will serve Atoka and Coalgate. Gas will be supplied from the Coal County field about 30 miles distant.

The Public Service Company of Texas, with headquarters at Fort Worth has extended its system, constructing during 1929 lines totalling some 200 miles, including a line into western Oklahoma, serving Gage, Shattuck, Fargo and Supply. Gas will be piped to the last two towns in 1930. Gas was supplied Gage and Shattuck in 1929.

The Public Service Company operates 200 miles of system, 175 of which was constructed in 1929 and 25 in 1930. The system originates in Wheeler County, Texas. Construction of a 40-mile extension is being started around May 1, from Perryton, Texas, to Follett, Texas.

More than 70 miles of transmission line have been added to the Houston Pipe Line Company's system during the past year, bringing its total of gas line operated along the Texas Gulf Coast, to between 650 and 700 miles.

The largest unit in this program was 14.6 miles of line constructed from Newgulf to the Long Point mine of the Texas Gulf Sulphur Company. Practically all of this extension was of 12¾-inch pipe. The second major unit was the looping of the company's line from Coleto Creek to the Guadaloupe River near Victoria. This loop line covered 8.6 miles. On this line 12-, 14-, 16- and 18-inch pipe was used.

A replacement job under way by the company in the Freeport district is of major proportions. The replacement includes a new 16-inch line from Freeport to Hoskins Mound of the Freeport Sulphur Company and a similar line from Freeport to the Bryan Mound.

BANNER YEAR FOR LONE STAR

During last year the Lone Star Gas Company of Dallas undertook a notable expansion program, constructing 593.4 miles of high pressure line and 297.54 miles of distribution main. A 20-inch line from Petrolia, Texas to Fort Worth and Dallas, a distance of 120 miles, was the largest single item in the construction program. Other high pressure line ranged in size from 16-inch to 4-inch with the majority of it being 8-inch and 12-inch.

The most important development of the company during last year was the purchase by the Lone Star Gas Corporation, on October 1, of properties including the Texas Cities Gas Company, gas distributing company operating at El Paso, Galveston, Waco, Paris, Brenham and Juarez; Council Bluffs Gas Company, operating a manufactured gas plant at Council Bluffs, Iowa; the Guthrie Gas Company, operating a natural gas system at Guthrie, Oklahoma; the Northwest Cities Gas Company operating manufactured gas plants in Walla Walla and Yakima, Washington, Lewiston and Clarkston in Idaho, and Astoria, Pendleton, Eugene, and Springfield in Oregon; and the Coos Bay Gas Company, operating a manufactured gas plant at Marshfield and North Bend in Oregon.

This purchase added more than 57,000 consumers to the Lone Star system. Of these 12,000 are now being supplied by the Lone Star Gas Company, pipe line subsidiary of the Lone Star Gas Corporation. The Lone Star system serves natural or manufactured gas to approximately 1,600,000 people. Last year the company added 17,541 residential customers to its lines and 237 industrial customers.

The Lone Star has under way the erection of a compressor station at Brad, Texas, and the laying of about 30 miles of field and discharge line. The company's interest in the line to Nebraska and Iowa points has already been touched upon.

The Lone Star is probably the oldest operating company in the Southwest, and now serves more than 266 towns, the great majority of them in Texas. A total of 3,505.4 miles of high pressure pipe line is operated by the company as of its January 1930 report, with a total mileage of distribution system amounting to 3,511.74 miles.

SOUTHERN UNION

Another company operating from Dallas is the Southern Union Gas Company. The system of this company is rapidly assuming major proportions, with most of its operations confined to Texas, New Mexico, Arkansas and Oklahoma.

Subsidiary to the Southern Union Gas Company are the Southern Union Gas Company of Texas; The Arkansas Western Gas Company; Gas Company of New Mexico; Southern Union Gas Company, New Mexico Corporation; Pioneer Gas Utilities Co.; Kingfisher County Gas Company and the M & M Pipe Line Company.

Practically all of this company's system has been constructed during 1929-30, with considerable additional expansion work being planned for the remainder of 1930.

The original line of the company was a 65-mile line coming from the Winkler County, West Texas, field, serving Wink, Pyote, Wickett, Monahans, Barstow, Pecos and Cheyene. In East Texas the company com-

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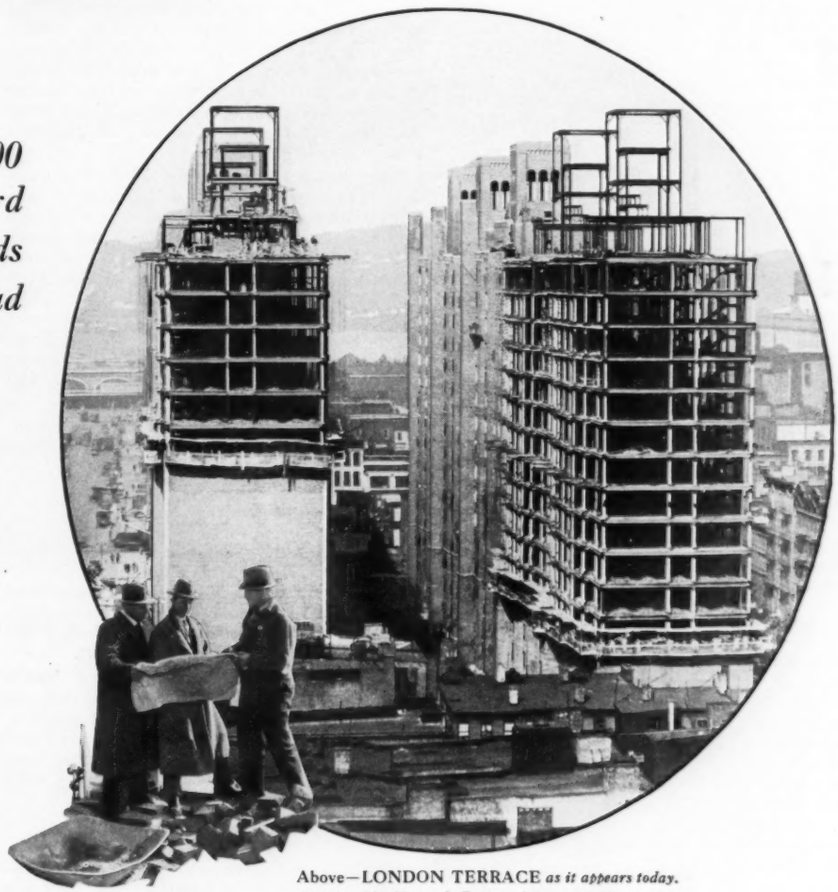
New York's $25,000,000 London Terrace in record Electrolux purchase adds 30,042 MCF to yearly load

A tiny gas flame takes the place of all moving parts.



Above—**LONDON TERRACE** *as it appears today.*
At left—*Mr. Victor C. Farrar of Farrar & Watmough, architects of London Terrace—on the job.*

1,669 Electrolux units! And in *one* apartment dwelling! Never before has such an immense installation been planned for *any* refrigerator. Because, never before has there been such an apartment development as London Terrace. London Terrace—a city in itself. Covering 160,000 sq. ft. Consuming building materials enough to provide housing for 25,000 people. With a garden court as big as some city parks. A swimming pool, a gymnasium, restaurants—even a private police force. And in every one of the 1,669 spotless kitchens . . . Electrolux.

Daily you see apartment houses going up about you. Not as large as London Terrace, perhaps. Yet suppose they had only 10 apartments apiece . . . for example. Every Electrolux installed would increase billing an average of 18 MCF a year. Or, a total of 180 MCF. And it would bring more. A generous profit from the sale. Increased prestige for the gas company. An impetus to the sale of other gas appliances.

What are *you* doing about it? Training special Electrolux salesmen? Securing plumber and dealer cooperation? Merchandising the free trial offer? All these are vigorous means of making this rich market your own. Housewives, builders, owners, architects . . . we're telling them all about Electrolux. In their favorite magazines, in their professional papers. And for closing the order . . . we've prepared just the sales helps you'll need. Don't wait. Ask us about them today. Write, wire or telephone Electrolux Refrigerator Sales, Inc., Evansville, Ind.

ELECTROLUX

THE *Gas* REFRIGERATOR

pleted during 1929 and 1930 a system of approximately 60 miles originating in the Racoon Bend field, serving at wholesale, Brenham, and at retail Hempstead, Prairie View, Waller, Navasota, and others. This system operates under the Southern Union Gas Company of Texas.

Late in 1929 the Delaware Corporation announced the purchase of the Arkansas Western Gas Company from the C. O. Moore interests which own the Stamford and Western Gas Company of Stamford, Texas.

The Arkansas company, organized during 1929, owned franchises in Fayetteville, Rogers, Bentonville, Springdale and other northwest Arkansas towns. Following the purchase, a gas system approximately 120 miles in length originating in the Clarksville, Arkansas, fields was constructed to these towns. Gas service in the towns began in 1930 through the line, which is made-up of 8-, 5-, and 4-inch pipe.

At about this same time the Southern Union interests purchased the Gas Company of New Mexico from the Albert T. Woods interests who own the Pecos Valley Gas Company, operating in New Mexico.

The purchased company was of late organization and held franchises in several New Mexico towns. Coincident with the purchase the Southern Union interests began the construction of a 52-mile 8-inch line tapping the South Plains Pipe Line Company line at Hereford, Texas, to serve Clovis, New Mexico.

Gas was supplied at Clovis early in January, 1930. The company has also constructed an 18-mile 6-inch line from Clovis, serving Portales. Plans are under way for the construction of a 65-mile line from Clovis to Tucumcari. Both Tucumcari and Lovington will be served with gas during 1930 through this line.

TO SERVE NEW MEXICO CENTERS

Other development planned for the immediate future by the Southern Union interests, is the construction of a 200-mile 12- and 14-inch line originating in the San Juan Basin near Farmington, New Mexico to Albuquerque and Santa Fe. Both of these towns have recently granted franchises to the Southern Union, the one at Albuquerque having been ratified at the polls on April 10. This company will operate under the name, the Southern Union Gas Company, New Mexico Corporation.

A construction project announced in April in Texas, calls for the laying of about 60 miles of 10-inch gas line from the Rycade gas field in Maverick county to the Central Power and Light Company power plant, northwest of Del Rio, Texas. This line is to be extended southwest and south to serve Eagle Pass, Carrizo Springs, Crystal City and other towns in the "Winter Garden" district in Zavalla and Dimmit Counties, Texas. Del Rio will also be served with gas. The Texas Gas Utilities Company, a subsidiary of the Appalachian Gas Corporation, will operate the system under the supervision of Union Management and Engineering Corporation.

The Central Power & Light Co., controlled by Middle West Utilities, has contracted to purchase the entire fuel requirement of its new central station electric power plant located near Del Rio.

The Consumers Natural Gas & Power Company, a subsidiary of the Empire Public Service Company, of Philadelphia, operating out of Fort Worth, constructed during 1929, 31 miles of 5½-inch line and has completed 32 miles of 8-inch line during the current year. The 1929 system extends from Lohn, Texas, to the Janellen field near Brownwood. The 1930 system is an extension from Bigspring, Texas, west to tap the South Plains Pipe Line Company's 10-inch line.

The Southwest Utilities Company, under which the Empire Public Service properties operate in the Southwest, plans also a line that will tie in at Brady with the line from the Janellen field which will serve San Saba, Goldthwaite, Lometa and Lampasas. Franchises have been granted the company in these towns.

The El Paso Natural Gas Company, which completed a line from Lea County, New Mexico, into El Paso last May, has during the past year constructed a stand-by service line at a point on its line over Salt Flat and Guadalupe Range. It has also constructed a lateral line from a point on its system near Clint to serve Clint and Fabens. This lateral line was constructed at a cost of approximately $150,000.

The South Plains Pipe Line Company with Texas headquarters at Lubbock, a subsidiary of the Prairie Oil and Gas Company and affiliated with the West Texas Gas Company, has added considerably to its system during the past year, and is planning even greater activity for the company year. The company's system has been extended to Hereford, Texas, and other points and to Shallowwater, Anton, Roundup, Yellowhouse, Littlefield, Amherst, Sudan, Muleshoe and Levelland.

Moran Corporation of Houston has constructed a 6-inch line from the White Point fields in San Patricio county to Aransas Pass serving several towns in that area. The system embraces about 25 miles of main line.

The Southwest Gas Utilities Corp., of Texas, a Belchic and Laskey property, feeding from the United Gas Company line extending from South Texas to Houston, and serving Cuero, Gonzales, Lockhart and other towns, has extended its system during the past year to a number of new towns.

The Southwest Gas Company of Texas owned by the same interests and serving Stephenville, Yoakum, Dublin, De Leon, Rising Star, Cross Plains, Cross Cut, Okra and other towns in central Texas has also been quite active. A number of these towns were piped for gas in 1929.

MONTANA PROJECTS NUMEROUS

Natural gas transmission line development in the state of Montana for 1929 has been evidenced in the bringing to completion of several lines from fields in northern parts of the state and planning of longer lines of major importance to metropolitan centers.

The Pondera Utilities Company was formed during the year, and immediately upon receiving its charter, began construction of a line from the Kevin-Sunburst fields near the international boundary to the city of Choteau. En route this line supplies Valier, and Conrad, with extensions planned to Bynum, Farmington, and several others. The line passes near the Pondera gas and oil field, and there supplies gas for drilling of wells.

Montana-Dakota Power Company, a subsidiary of Minnesota-Northern Power Company, during 1929 laid plans for two major extensions from the Baker-Glendive field. One of these lines will extend from Glendive, Montana, to Williston, North Dakota, a distance of approximately 90 miles, and will serve towns in Montana and North Dakota en route. Among these will be Stipek, Burns, Savage, Crane, Sidney, Fairview, Montana; and Cartwright and Trenton, in North Dakota. The line will connect at Glendive with the company's line conveying natural gas from Cabin Creek field.

Hope Engineering Company has established offices at Glendive, and has begun preparations for laying the Williston extension, cost of which is estimated at more than $1,000,000.

The second line will extend from Baker-Glendive field to Bismarck, North Dakota, and will serve Mandan Beach, Sentinel Butte, Dickinson, Richardson, Hebron, Antelope, Taylor, and many other towns in North Dakota, and Wibaux, Ollie and Carlyle, Montana. Both of these extensions are to be completed during 1930.

A line of major importance, plans for which are now in the formative stage, is the 310-mile industrial carrier from Wyoming gas fields to serve smelters in Anaconda and Butte, and to carry gas for industrial and domestic purposes to towns located along the route of the line. This project will originate in Big Horn Basin in northern Wyoming, and will progress in a northwesterly direction to its objective. Hope Engineering and Moody-Seagraves interests as well as other companies have been named by reports as participating in the project, cost of which is estimated at approximately $20,000,000. Extensions would probably be laid to Helena and Bozeman.

Montana Utilities Corporation, newly organized, has tentative plans for the transporting of natural gas from Bowes structure in northern Montana to Moosejaw and Regina, Saskatchewan. This line would be the first to carry Montana gas across the international boundary for any distance, for the purpose of serving larger Canadian towns.

Permits have also been obtained from the Canadian government to export gas from Dominion fields across the international boundary. Range Oil & Gas Co., of Calgary, is named in reports as interested in taking a line into Butte and other Montana centers from Turner Valley field near Calgary.

CANADIAN NATURAL GAS

Activity in Canada during 1929 included the construction of a transmission line from Viking gas fields to Holden by the Northwestern Utilities, Ltd., at a cost of $296,000, the line to be completed to Ryley, at an additional cost of $130,000.

Possibilities that Turner Valley gas will be taken into Edmonton during the coming year have been mentioned. Candian Western Natural Gas, Light, Heat & Power Company has been investigating the practicability of such a line, which would be approximately 175 miles long.

Montana gas for several cities in Saskatchewan is also in prospect for 1930, if plans of Montana Utilities Corporation mature.

COLORADO EXTENSIONS

Two projects of major importance added appreciably to the total of natural gas transmission lines in Colorado. A line was completed by the Colorado-Wyoming Gas Company from Fort Colline to Littleton, completing the final link to connect Cheyenne, Wyoming, and Denver. The carrier from Fort Collins added a total of 102 miles of main line and laterals. Gas from the Ute Dome in New Mexico was taken about 35 miles across the border to Durango, by the Mesa Grande Gas Company, this being the first line of importance to find its source in the New Mexico structure. Lines were completed also to La Junta, Swink, Fort Lyons, Rockyford and Las Animas, the sup-

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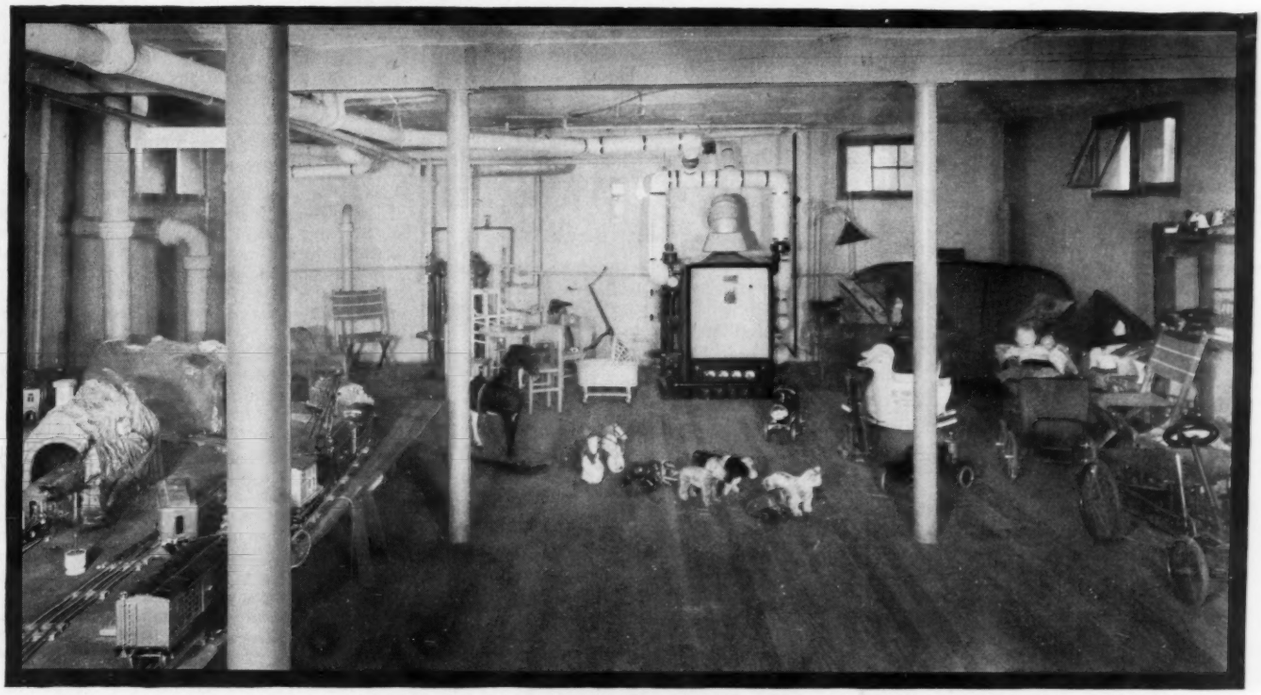
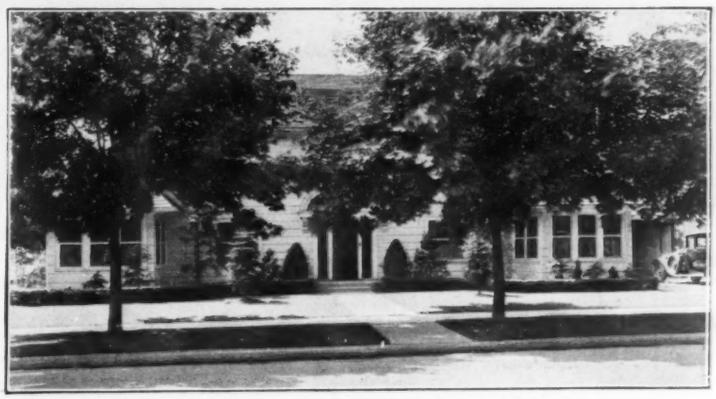
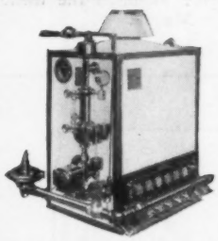


Modernized basement of beautiful home on Bedford Avenue, Brooklyn



IDEAL
GAS BOILERS



WHEN an Ideal Gas Boiler was installed in the basement shown above it gave the owner an extra room ideally suited for a play-room for his children.

Ideal Gas Boilers burn noiselessly, cleanly, efficiently, and automatically — and they require no fuel storage or handling and no ash removal.

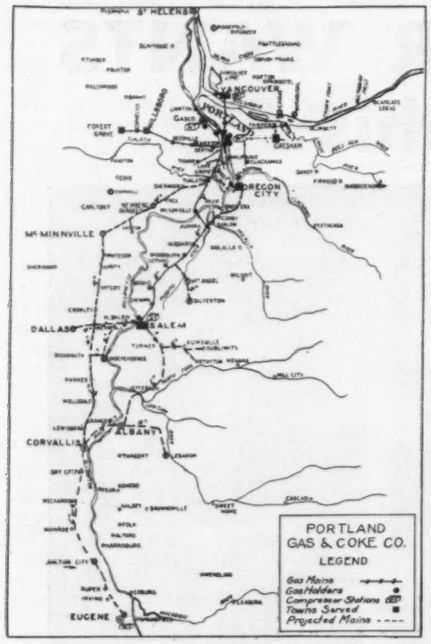
That is why every home owner can instantly see its advantages. It helps to make any home truly modern.

manufactured by

AMERICAN RADIATOR COMPANY

distributed by

AMERICAN GAS PRODUCTS CORPORATION
Chrysler Building, New York



Map showing present and proposed high pressure transmission system of Portland Gas & Coke Company.

ply coming from Colorado Interstate Gas Company's Amarillo-Denver transmission line.

Colorado Interstate Gas Company completed a $600,000 compressor station at Model, on the Texas-Denver line, and two others are under construction on the same carrier, one at Devine, to cost $600,000; another at Texline, near Clayton, N. M., to cost $500,000.

UTAH AND IDAHO

Western Public Service Corporation's activities in Utah have continued during 1929 with the addition of several miles of transmission lines to Garfield, Midvale and Sandy, and the securing of franchises in several other cities and towns. Gas from the Baxter Basin-Salt Lake City line, operated by subsidiaries of Western Public Service, is being used chiefly for industrial purposes in Garfield. Provo, 40 miles south of Salt Lake City, is scheduled to receive gas during the coming months for industrial and domestic load.

An important program is under way for extension of the Wyoming-Utah line into cities in southeast Idaho. This line would be approximately 125 miles long, and would serve numerous small towns en route to Pocatello. Permission has been obtained by John B. McFayden and L. B. Denning to exercise franchise rights in Pocatello as well as several other Idaho towns. Cities and towns in northern Utah would also receive gas from this extension, chief among these being Logan, railway center for the territory.

Western Public Service Corporation is the holding company for several organizations participating in the Utah development. Uinta Pipe Line Company, Wasatch Gas Company, Utah Gas and Coke and Ogden Gas Company, all come under the banner of Western Public Service. Franchise activities in Utah have been carried on mainly through the Wasatch Gas Company.

While the stage has been held by natural gas development during the past year, it is significant to note the strides which manufactured gas transmission has taken during the period in the Northwest. A 10 and 8-inch line was constructed by Portland Gas & Coke Company to transport 570 B. t. u. oil gas to Salem, Oregon, a city of 27,500 population, 50 miles from the company's plant at Portland. Other towns in the Willamette Valley on the route of the line were reached by extensions, adding a total of more than 30,000 consumers to the Portland Gas & Coke Company system. The company plans during 1930 and 1931 to take the line on south to Corvallis, and Albany, with laterals to serve the many smaller towns situated near the route. The total cost of the Salem project was $800,000.

PACIFIC NORTHWEST NATURAL GAS

With the discovery of natural gas in commercial quantities in Benton County, Washington, the Northwestern Natural Gas Company secured franchises for the service of the fuel in Grandview, Sunnyside and Mabton. Inaugurating the first natural gas service to be installed in the Pacific Northwest, the line to Sunnyside, 25 miles of 6-inch pipe, was completed, with extensions to Prosser and Grandview, adding 30 more miles to the system. A program of expansion is getting under way, with projected lines to Pasco, Kennewick, Toppenish, Wapato and Zillah. Possibilities that the line may extend to Walla Walla, 40 miles southeast, have also been advanced.

Notable in gas extension work over the past year has been the constructing of replacements and extensions of city distribution mains. While no attempt has been made to record this development, yet it occupies a very large place in gas company budgets for the past year. A few apt examples of this type of extension work are the following: Dallas Gas Company, which expended approximately $400,000 during the past summer in improving its distribution system. The San Antonio Public Service Company announced in January improvements in its gas system for the year amounting to $570,995. Los Angeles Gas & Electric Corporation in 1929 showed a total net increase of 40 miles in its gas main system, in sizes of 2- to 16-inch, the additions costing $565,627. Main construction planned for 1930 involves a net increase of 73 miles in sizes on 1- to 16-inch, at a total estimated cost of $575,425. To date this company has expended $30,000 on gas main construction.

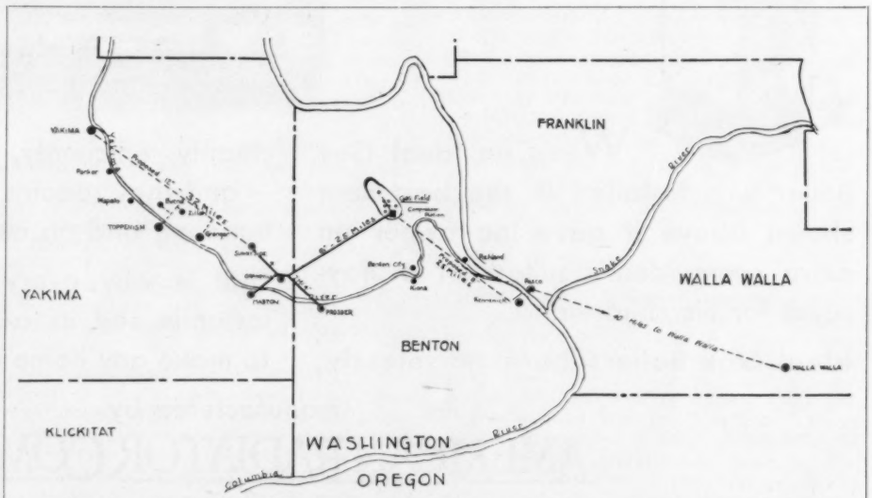
There are other developments which should receive mention in this review, but the expansion programs which have been touched upon are more than sufficient to indicate what the trend will be for the last half of 1930. Many of the 1929 transmission lines not treated in this discussion are listed in the tabulations published in the same pages.

GAS REFRIGERATOR OF NEW TYPE ANNOUNCED

An automatic gas refrigerator, said to be of revolutionary design, has been developed at Boston, Mass., according to announcement made at headquarters of the American Gas Association. J. J. Bodell of Providence, Rhode Island, financed this work which is understood to have been progressing for the past six years. Only recently has the information of the construction of the first commercial units of this new type refrigerator been made public. Design of this new unit is said to be such that it cannot be included under any previous classification of refrigerators. It employs water as the refrigerating fluid, air for cooling and mercury vapor as the source of energy. This unit may be placed either in the basement or put into the icebox itself. Gas engineers believe that it may also be of value in connection with the development of house-cooling systems, because it is said that it will be possible to manufacture it conveniently in large sizes.

J. M. PATTEN GOES TO N. Y. AS ASSISTANT TO T. F. KENNEDY

J. M. Patten, industrial supervisor of the Kansas City Gas Company for the past three years, has been appointed as assistant, in an engineering capacity, to T. F. Kennedy, new business manager of Henry L. Doherty & Co., with headquarters at New York. Mr. Patten has been associated with the Doherty organization for the past 10 years, having served the company in various capacities during this period. He assumed the duties of his new position in March.



Northwestern Natural Gas Company is serving the first natural gas to be developed in the State of Washington. The company's lines and planned extensions are shown above.

NEW!

The A-B 'Aristocrat', 1100 Series Gas Range

Fully Insulated Oven

The AutomatiCook
Oven Heat Regulator

Dual Burner Cooking Top

The Insta-Flame
(No matches necessary)

The Sani-Tray (Pat. Applied for)
To keep the oven bottom clean

AND MANY OTHER SALES-BUILDING FEATURES!

Outstanding Among All Fine Ranges

WRITE OR WIRE FOR FULL DETAILS

If you have not received your copy of our 1930 Merchandising Manual write for it today.

A-B STOVE CO., Battle Creek, Mich.

Gas Analysis—California Oil *and* Gas Fields

Compiled by R. M. Bauer, Gas Supervisor, Southern California Gas Company

FIELD	DATE	KIND OF GAS	ANALYSIS CO_2	O_2	CH_4	C_2H_6	N_2	CALC. B.t.u.
Athens-Rosecrans	9-29-26	Casinghead	0.8	....	82.9	16.4	....	1128
North Belridge	12-00-29	Casinghead	1.3	0.3	84.4	12.2	1.8	1055
Buttonwillow	3-31-28	Dry	0.6	....	98.3	.....	1.1	991
Brea-Olinda	1-26-29	Casinghead	1.0	....	66.6	31.3	1.1	1202
Buena Vista Hills	5-10-29	Casinghead	18.5	0.2	60.2	19.8	1.3	952
Buena Vista Hills	5-10-29	Dry	0.7	0.0	97.4	0.9	1.0	996
Dominguez	5-23-29	Casinghead	0.6	....	80.5	18.6	0.3	1121
Elwood	3-11-29	Casinghead	....	0.1	75.4	24.5	....	1172
Elk Hills	5-10-29	Casinghead	4.0	0.2	88.3	5.8	1.7	982
Elk Hills	5-10-29	Dry	6.0	....	92.1	0.8	1.1	937
Huntington Beach	12- 4-29	Casinghead	2.7	....	79.2	18.0	0.1	1099
Inglewood	12-13-29	Casinghead	11.1	0.1	70.8	13.8	4.2	943
Kettleman Hills	11-14-29	Casinghead	....	....	79.0	20.3	0.7	1148
Long Beach	12- 7-29	Casinghead	0.9	0.1	71.3	27.3	0.5	1179
Potrero	5-16-29	Casinghead	0.6	0.1	74.1	24.4	0.8	1157
Santa Fe Springs	1-24-30	Casinghead	0.4	0.1	76.1	23.3	0.2	1158
Seal Beach	6- 4-29	Casinghead	0.5	0.1	83.7	15.1	0.6	1092
Torrance	4- 2-29	Casinghead	4.5	0.4	82.7	12.0	0.4	1029
Ventura Avenue	10-31-29	Casinghead	....	....	84.4	13.9	1.7	1097

Mid-West Gas Ass'n. Celebrates Silver Anniversary

By H. Elliott Taylor

San Francisco Manager, WESTERN GAS

J. M. DRABELLE of Cedar Rapids, Iowa, was elected president of the Mid-West Gas Association for the coming year in its recent Silver Anniversary Convention, held at Waterloo, Iowa, April 14-16.

Waterloo was selected for the meeting place of the association on this 25th anniversary of the birth of the organization, as a tribute to H. B. Maynard of that city, for it is in a large measure due to his early efforts that the Association has attained its present scope.

"Best beloved of the 'gas house gang'" is the succinct tribute paid to Mr. Maynard, by the gas men of Iowa, Minnesota, Nebraska, North Dakota and South Dakota at Waterloo, Iowa, from which membership in the Association is drawn. Mr. Maynard was one of the founders of the Iowa District Gas Association, which later grew into the Mid-West Gas Association.

All of the meetings, which extended over a period of three days, were predominately commercial and as usual in any present day discussion of the gas industry, natural gas almost ran away with the show.

Discussions evoked by the various papers read were evidence of the interest that executives and leaders of Middle Western utilities are taking in the subject of merchandising of gas and gas utilizing appliances.

Bernard J. Mullaney, president of the American Gas Association, was the first speaker following the formal exchanges of courtesies and welcome. He spoke glowingly of the future of the gas industry in his address "What is Ahead of Us."

A paper prepared by E. L. Fischer, "Natural Gas as Applied to Existing Gas Systems," was read, and the remainder of the first morning was devoted largely to reports.

In the afternoon session of the first day, Joseph Ainsworth spoke on the Gas Meter Short Course, W. E. Derwent and R. H. Luscombe on various phases of gas house heating, followed by C. A. Miller on gas refrigeration. A. T. Barrett delivered an A.G.A. report.

Tuesday was particularly interesting to the hot water enthusiasts. M. N. Marshman of the Cleanliness Institute, New York City, spoke on the work that is being done by this central bureau, to increase the interest of the public in soap and water. The Institute is financed by soap interests, and spends a million dollars a year telling the American in many and divers ways that he should wash often. The obvious connection between this campaign, and the results that the gas industry might obtain by cooperating in it wherever possible was discussed at length. James E. Trainer, speaking on laundry driers, and R. H. Lewis on automatic water heaters, were other features of the day.

H. B. Maynard (at right) organized the Iowa District Gas Association, predecessor of the present Mid-West Gas Association. He was honor host to the Mid-West group's 25th convention at Waterloo last month. With Mr. Maynard is Joe Carmichael, director of the Iowa committee on public utility information.

Louis Stein held the attention of the Tuesday afternoon audience with his paper, "Some Thoughts On Manufactured Gas."

John F. Parker, Rockford, Ill., officiated as toastmaster at the Tuesday evening banquet, which did honor to his old friend, H. B. Maynard. A silver set was presented to the latter, as a token of the association's appreciation of his services and his years of counsel and guidance. The same age to a day, Mr. Parker and Mr. Maynard look back with pleasant reminiscence to the time when the former was toastmaster at a similar banquet in Waterloo, 21 years ago.

Carl Meyers, Alfred Uhalt, and E. J. Otterbein were the speakers slated for the Wednesday morning session, at which accounting, training of salesmen, customer relations were all discussed.

In conclusion, retiring president E. H. Vieregg delivered his President's Address.

The only remaining business was the meeting of the new officers counsel which consists of J. M. Drabelle, president; John K. Swanson, first vice-president; W. E. Derwent, second vice-president; R. B. Searing, re-elected secretary-treasurer. Council members are R. H. Garrison, H. R. Schmidt, R. E. Taylor, R. L. Klar, Frank Millholland, C. T. Williams, A. T. Barrett and P. J. Montgomery.

VANCOUVER CONSTRUCTION PROGRAM UNDER WAY

The gas department of the British Columbia Electric Power & Gas Company, Ltd., Vancouver, B. C., has several construction projects in prospect. Laying of a 4-inch main from the Grandview holder station to the Second Narrows Bridge, which will convey gas to the north shore, is first in order, the route now being surveyed, and part of the work under way.

The work is estimated to cost $15,000. The site for the high pressure gas holder to be built in North Vancouver is now being put in shape for preliminary construction work, construction to begin in May. The holder will be the first untit of a station which will supply domestic gas to the residents of the north shore.

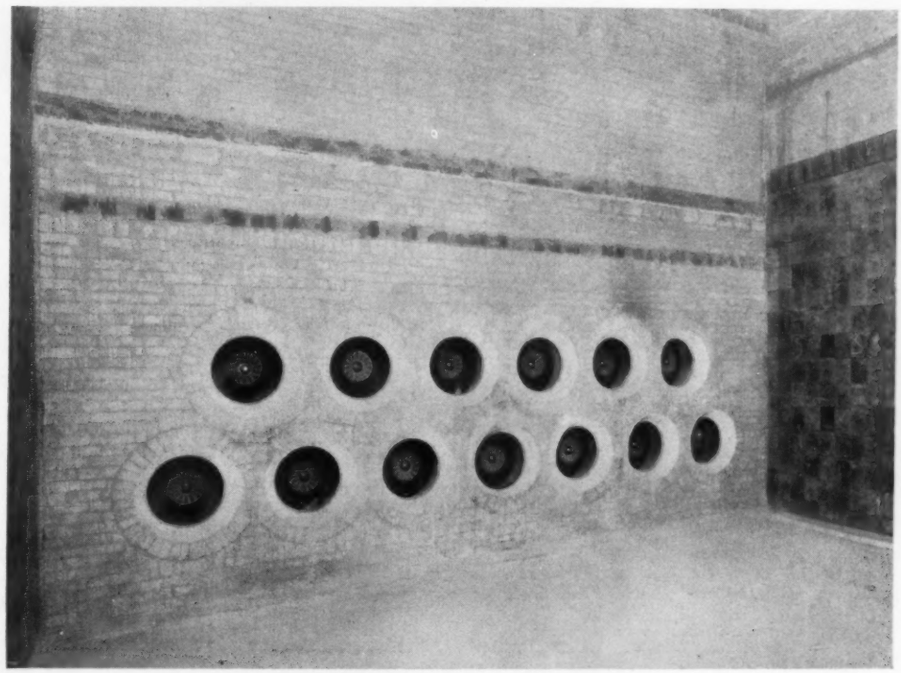
Important extensions to existing mains will be carried out in the Grandview district, where several new lines of 4-inch and 2-inch pipe will be laid. This work is estimated at $14,000. General gas main extensions in various other parts of the city will add $8,000 to the cost of gas extension work within the next few months.

SOUTHERN COUNTIES OPENS CLAREMONT OFFICE

A new office has just been opened by the Southern Counties Gas Company in Claremont, California.

Excellent facilities have been provided in the office for displaying a complete line of gas appliances. Heretofore Claremont customers were served through the company's office in Pomona or Ontario.

The FORNEY Combination Gas and Oil Burner



is being used by many of the largest Central Stations where economy and flexibility of changing from one fuel to the other are of primary importance.

In the quick change type both the oil and gas elements remain in place and are ready at all times for an instantaneous changeover, without making up any connection. Both the gas and oil elements can be easily removed and quickly cleaned with the boiler in service.

Freedom from pulsation, no flame travel with gas, ruggedness of construction, low initial cost and low maintenance cost are some of the features of Forney equipment.

Write for list of installations.

Forney Combustion Engineering Co.

305 Thomas Building

Dallas, Texas

Artist's drawing of company headquarters now building for Dallas Gas Company.

Dallas Gas Co. *to* Have New Home

ANNOUNCEMENT has been made by the Dallas Gas Company of the construction of a 9-story office building costing approximately $700,000, on the corner of Jackson and Harwood streets, a prominent location recently purchased from the Lone Star Gas Company, an affiliated organization.

Work has already begun on the building, which is being erected in the same block as that occupied by the building of the Lone Star Gas Company. This latter building stands at the corner of Harwood and Wood streets. It is likely that the new building will be ready for occupancy around the first of the year.

The new edifice will have total floor space of 63,078 square feet and 35,950 square feet, or about 57 per cent, will be occupied with the offices of the Dallas Gas Company. The remainder of the floor space will be leased, and it is understood that this space has already been rented.

The structure will be of modern architecture with set-back floors. Offices will be equipped with a tube conveying system for handling orders between floors. It is also planned to install an air conditioning plant to serve the first floor and basement.

An auditorium seating between 400 and 500 people, which will be devoted to the use of employee meetings, cooking demonstrations and similar activities, will be a part of the building.

The first floor and basement will carry displays of gas burning appliances, and announcement is made that coincident with moving into the new building a policy of merchandising gas appliances will be inaugurated.

Executive offices of the company, of which Henry C. Morris is president, will occupy the ninth floor of the building.

J. J. WEIEN NAMED MANAGER OF UNION PUBL. SERV.

Joy J. Weien has been appointed as manager of the Union Public Service Company at Baldwin, Kansas, succeeding John Blaney, resigned. Mr. Weien was formerly associated with the company at the Ottawa, Kansas, office.

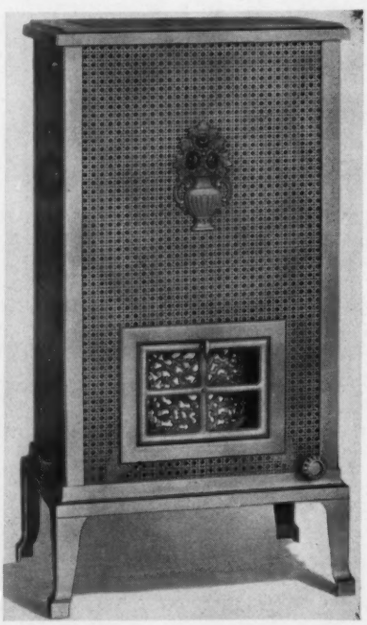
LINE EXTENSIONS PROPOSED FOR SOUTHERN CALIFORNIA

As *Western Gas* goes to press it is learned that the Southern California Gas Company has plans under consideration to increase its facilities for transmitting gas from Kettleman Hills to Los Angeles. The contemplated plans are to parallel the company's existing line serving Los Angeles from San Joaquin Valley fields with 40 miles of 22-inch pipe. From Castaic to Sawtelle, a distance of about 30 miles, a further addition of 22-inch and 26-inch line is also proposed. An increased supply of gas from the Kettleman area of 42,000,000 cubic feet daily would be made possible by the proposed program.

GUARDIAN APPLIANCE CO. ANNOUNCES NEW HEATER

A new cabinet heater, gas-fired, warm air circulating type, has been announced by The Guardian Gas Appliance Co., Cleveland, Ohio. A one-piece, cast iron heat chamber of zig-zag fire travel design has been developed. Seventy-eight lineal inches of fire travel and 1,200 square inches of cast iron radiating surface are condensed into compact form. The chamber is air-tight for assurance against sweating of windows and against any by-products of the burned gas escaping into the room.

The manufacturer states that the gas burner is designed to give high operating efficiency at all gas pressures and cannot flash back. The open, screen effect cabinet work allows quick volume circulation of



warm air. The design throws heat downward so that the floor surrounding the heater is warmed.

The heater is finished in a grained, light walnut color. Radiants are of new style, a blazing fire design. It is adaptable to thermostatic control and is equipped with a humidifier. Two sizes are provided—Model No. 1 burns 45 cubic feet of gas per hour; Model No. 2, 90 cubic feet per hour.

J. R. MUNCE OF ARKNATCO ON HONOLULU TRIP

J. R. Munce, vice-president of the Arkansas Natural Gas Corporation of Shreveport, and Mrs. Munce sailed recently for Honolulu for an extended visit.

M. A. HARDIE RESIGNS POST WITH UNITED COMPANIES

M. A. HARDIE has announced his resignation as vice-president and general manager of the Houston Gulf Gas Company and the Dixie Gulf Gas Company of Houston. Both of these companies are gas transportation subsidiaries of the United Gas Company. His resignation became effective on April 1.

Mr. Hardie began his oil field work in 1895, with a West Virginia Company and since that time has been identified with various gas production, gas pipe line and distribution companies throughout the United States and Canada.

Among these companies are Carter Oil Company in West Virginia; United Natural Gas Company of Oil City, Pa.; the Canadian Western Natural Gas, Light, Heat & Power Company, Ltd., of Alberta, Canada; and the Producers and Refiner's Corp., Parco, Wyoming.

In 1928 he became associated with the Houston Gulf Gas Company as general manager. Later he was made vice-president of the company, and finally he was appointed vice-president and general manager of the Dixie Gulf Gas Company, an affiliated organization.

The Houston Gulf Gas Company pipe line system extends from southwest Texas to Houston, and the Dixie Gulf Gas Company system from Waskom, northeast Texas, to the Gulf coast.

GAS CO. PROVIDES SPOKANE M.D.'s WITH PAMPHLET ON ASPHYXIA

Spokane Gas and Fuel Company, cooperating with the Spokane County Medical Society of Spokane Washington, sent copies of an American Gas Association pamphlet on resuscitation to the members of the society. The booklet was enclosed with the April issue of the medical society's "Bulletin" and dealt with acute asphyxia as a medical problem, and the efficiency of the oxygen-carbon dioxide treatment of carbon monoxide poison. This enclosure was supplied and the cost of mailing paid by Spokane Gas and Fuel Company. An editorial in the same issue of the "Bulletin" praised the cooperation of the gas company in bringing before the medical profession by means of the pamphlet the latest methods of the treatment of asphyxia.

N. G. E. TULSA OFFICE IN LARGER QUARTERS

Tulsa offices of Natural Gas Equipment Inc. have been moved from the Atco Bldg. to larger quarters at 311 East Second Street. In addition to the line of N. G. E. Burners, the company also distributes the Wilgus pressure regulator, and Anubis differential recorder.

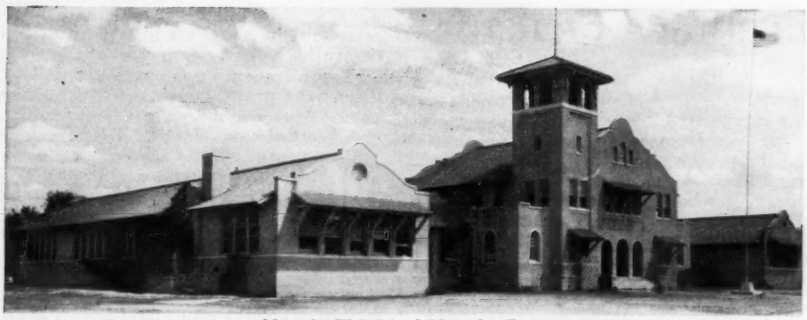
Virgil E. Ready has been assigned to the new Tulsa office as resident manager, and Julian C. Monax as sales engineer.

PAC. LIGHTING CORP. REPORTED IN STANDARD SUBSIDIARY DEAL

According to report late in April, the Pacific Lighting Corporation has acquired a 10 per cent interest in Pacific Public Service Corporation, subsidiary of Standard Oil Company of California, through which Coast Counties Gas and Electric Company is operated.

DOHERTY MAN NAMED PRESIDENT OF JOPLIN C. OF C.

Milo L. Margenau, district manager of the Empirt District Electric Company, a Doherty property at Joplin, was recently elected president of the Joplin Chamber of Commerce.



Mercedes High School, Mercedes, Texas

SCHOOL HEATING WITH CLOW GASTEAM

Cubical Content, 146,125 Cu. Ft. Sq. Ft. Floor Space, 11,738 Sq. Ft. Seating Capacity, 350

TYPE OF CONSTRUCTION

13″ Plain brick faced with 7/8″ Kellastone plaster.
Exposed walls in arcades—6″ hollow tile faced with 7/8″ Kellastone plaster.
Ceilings Metal (Scotia 1¼x1¼).
Roof—Metal tile 10x14 on wood sheathing.
Metal weather strips on all windows.
Wood weather strips on all outside doors.

Hundreds of schools, Clow Gasteam equipped, bear testimony to the wide and rich market for gas sales open to gas companies with this proven heating system. A lucrative heating load, a real merchandising profit, and satisfied customers, are Clow Gasteam possibilities which warrant the genuine consideration of your company.

HEATING REQUIREMENTS

Degree days	800
Exposed walls	16,322 Sq. Ft.
Total glass and doors	3,367 Sq. Ft.
Floors	11,738 Sq. Ft.

CLOW GASTEAM RADIATORS INSTALLED

	List Price	Radiation Sq. Ft.
14— 8 sec. 4 tube 38″ Unvented	$1008.00	896
1—10 sec. 4 tube 38″ Unvented	84.00	80
5—15 sec. 4 tube 38″ Unvented	575.00	600
2—10 sec. 4 tube 26″ Unvented	134.00	100
1— 8 sec. 4 tube 26″ Unvented	58.00	40
23	$1859.00	1716

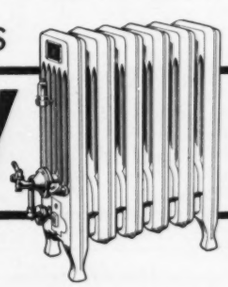
OPERATING COST—Season 1928 to 1929

NOTE—*Above listed gas bills include gas used in Physics and Chemistry Laboratories and Cafeteria.*

September to October 19th, 8,000 Cu. Ft. Natural Gas	$ 5.04
October 19th to November 21st, 12,000 Cu. Ft. Natural Gas	7.56
November 21st to December 20th, 52,000 Cu. Ft. Natural Gas	32.76
December 20th to January 18th, 28,000 Cu. Ft. Natural Gas	17.64
January 18th to February 19th, 40,000 Cu. Ft. Natural Gas	25.20
February 19th to March 20th, 16,000 Cu. Ft. Natural Gas	10.08
March 20th to April 20th, 6,000 Cu. Ft. Natural Gas	3.78
April 20th to May 20th, Minimum Bill	1.50
	$103.56

JAMES B. CLOW & SONS 201-299 N. Talman Ave., Chicago

CLOW GASTEAM



Listed by Underwriters Laboratories

Approved by A. G. A. Testing Laboratory

Romance *of* Gas *in* New Orleans

(Continued from Page 67)

In 1845 the company's banking privileges were withdrawn and it became the "New Orleans Gas Light Company," with the interesting proviso that it should never raise the price of gas above $6.00 per thousand cubic feet. In 1849, Mr. Caldwell proposed to introduce gas as a street illuminant in place of oil lamps. There is no record of his proposition being accepted, but tradition says that he did obtain a contract and install the system. By 1854 the company was evidently doing too well in the opinion of conscientious reformers, and the price was fixed at a maximum of $4.50. Another drop was required in 1860 to $4.00.

Even at this price the business must have been good, because in 1870, by hook or crook, the "Crescent City Lighting Company" was given a franchise for the exclusive gas privilege for 50 years from 1875, when the old company's franchise was to expire; without prejudice, however, to the "Jefferson City Gas Light Company," which had exclusive rights for what became later the Seventh and Eighth Districts of New Orleans. In 1874 a merger was effected under the old name, which it retained until the organization of the New Orleans Public Service Inc., in 1922. In 1881 an opposition company was projected, but litigation terminated in favor of the old company. The Jefferson City company ceased operation in 1900, when its charter expired, and the old company purchased its tangible property and afterwards served the whole city.

The gas business, according to one of the former executives, grew with the city until about 1872, when the zenith of the old days seems to have been reached. From then until 1901, "owing to the failure of the company to adapt itself to changing conditions," the business did not develop as in the past. An old graph shows a decrease from 1872 to 1901 in annual output from 270,000,000 cubic feet to less than 200,000,000. In 1901 the "New Orleans Lighting Company, Lessee," seems to have brought in new blood, and the active development of the cooking load and the use of various appliances brought back prosperity. The result showed in the increase in one year from a production of less than 200,000,000 cubic feet to nearly 500,000,000.

GAS PLANT OF 1928

Many transformations took place, until the New Orleans gas plant of 1928 was among the largest and most modern in the South, with a maximum capacity of 30,000,000 cubic feet per 24-hour period. The fires started in the furnaces of the early gas plant, built on the site of the later plant, were never allowed to die out. For 93 years this flame burned, first serving only to produce gas to light the streets and homes of New Orleans; later, when the incandescent lamp threatened the gas lighting industry, producing gas for fuel, for cooking and heating purposes. The fires that were started in the furnaces of this gas plant saw New Orleans grow from a small Creole settlement to a great thriving metropolitan community, today the second port of the nation. However, there came a time for the artificial gas flame to flicker out, giving way to man's genius and nature's bounty . . natural gas.

No history of gas in New Orleans is complete without some reference to the change-over from manufactured to natural gas. From the hills of North Louisiana, across hundreds of miles of swamp, marshlands, rivers, creeks, and lakes, came a superior fuel, and on August 22. 1928, natural gas was available for domestic consumers in New Orleans.

Being unfamiliar with natural gas the people of New Orleans were confronted during this change-over with many problems. A series of advertisements was published by the company, explaining the system adopted by the authorities of dividing the city into zones for convenience in "turning on" the new gas. These advertisements cautioned the housewives in the adjusting of old appliances to accommodate a different fuel. They were designed primarily to be generally helpful in answering those questions which might arise in the minds of puzzled consumers. The New Orleans Public Service Inc., furnished natural gas service men to adjust the burners of all gas ranges. Adjustments of the burners in water heaters, room heaters and other appliances were made by outside plumbers and dealers. Making natural gas adjustments meant more than 300,000 gas appliances to be regulated and serviced, and approximately 1,500,000 gas orifices to be changed. Four hundred men were trained for this large task four weeks before natural gas was actually introduced. Advance notification of the date natural gas was to be furnished in each of the five zones was sent to residents of these respective zones, and as soon as the natural gas was "turned on," these especially trained service men called at all homes in the district to adjust range burners. As soon as all adjustments had been made in one zone, the men proceeded to the next, until all five zones had been completed. In the remarkably brief span of 15½ working days the task of adjusting the 300,000 gas burners on the ranges of 70,000 customers, was completed. This accomplishment is further glorified by the fact that no accident or mishap of even the slightest nature, occurred to mar the progress of the work. Credit for this outstanding record should be widely distributed. Whole hearted cooperation was tendered by the master plumbers, jobbers, and water heater dealers whose assistance was essential. The housewives, realizing the vastness of the work the service men were doing, by their courtesy and consideration, greatly expedited the job. And to the great army of 400 change-over men, who worked with enthusiasm, zeal and despatch, great credit is due.

This early series of advertisements had caution as their prime motive. Following this series it was considered expedient to publish another series of advertisements discussing simply and interestingly the problems which arose in the distribution of natural gas. The peculiarities of the new fuel and its manifold advantages were presented, the underlying emphasis being always that by following the solutions offered, the best results in efficiency, safety and economy could be attained.

New Orleans' experience of a year and a half in the use of natural gas has been quite satisfactory, the daily send-out increasing from 22,222,000 cubic feet, the maximum send-out of manufactured gas, to 47,075,255 cubic feet per day, the maximum daily send-out of natural gas, to domestic, commercial, and industrial users.

The evolution of any great industry is always absorbing history to those who are associated in it, but the history of the gas industry in New Orleans has special appeal. Its development was anything but humdrum; the growing pains it suffered threatened at times to be more serious than mere childhood diseases, but the disasters and disappointments which arose were encountered and overcome with a courageous spirit. And through it all there persists a thread of romance which was inserted in the weave of the pattern, and from which no stitch has ever been dropped.

New Gas Communities

(Continued From Page 76)

TEXAS

Southwest Utilities Co.
- San Saba
- Goldthwaite
- Lometa
- Lampasas

UTAH

Western Public Service Corp. and affiliated interests
- Perry
- Box Elder
- Willard
- Logan
- Pleasant Grove
- Lehi
- American Fork

WASHINGTON

Northwestern Natural Gas Company

Pasco	5,000
Kennewick	2,000
Toppenish	4,000
Wapato	1,500
Zillah	500

A. G. A. AWARDS SCHOLARSHIPS TO U. OF OKLAHOMA

The American Gas Association announced recently an award to the University of Oklahoma, of one of two Fellowships in Natural Gas Research. This award follows two years of research work, on the part of the Association, to determine the institutions which should be given this recognition. The University of West Virginia is the recipient of the second award.

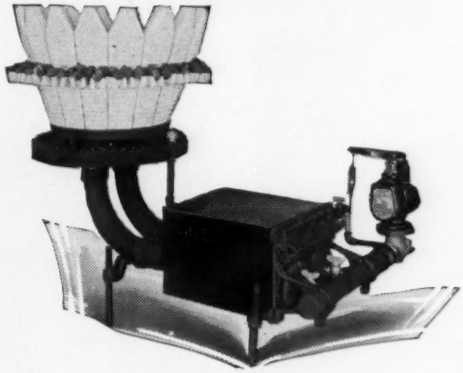
Each award has a monetary value of $500 per year, and is given annually to the student in each institution nominated for the honor by the president and faculty of the university. The fellowship becomes effective in September, 1930.

E. J. Stephany, secretary of the Natural Gas Department of the American Gas Association recently announced the award before the Southwestern Gas Measurement Short Course, held annually under the direction of the College of Engineering of the University of Oklahoma.

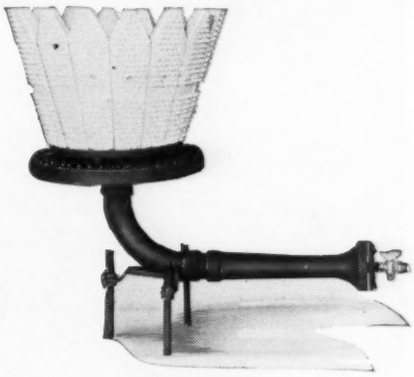
GREESON AND ASSOCIATES GET ARKANSAS FRANCHISES

M. W. Greeson of Prescott, Arkansas, and associates are reported to have gained gas franchises in DeQueen, Mena, Horatio, Foreman, and other towns along the Kansas City Southern railway in Arkansas. Davenport, Iowa interests are said to be offering financial backing for the enterprise which will pipe gas to the towns from fields in the northwestern part of the state.

SERIES A
Made in 4 Sizes

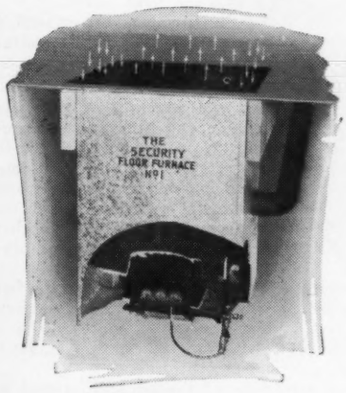


SERIES B
Made in 3 Sizes



SERIES C
Made in 3 Sizes

This page illustrates just a few of a large line of new and strictly up-to-date gas appliances



SECURITY FLOOR FURNACE
Made in 2 Sizes

Manufactured by

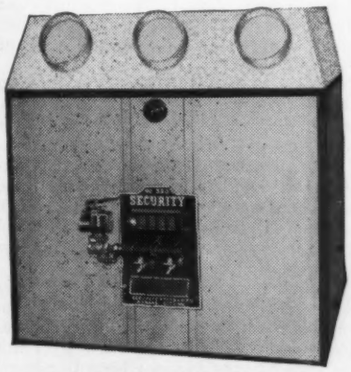
The Security Stove & Mfg. Co.

1630 Oakland Ave.
Kansas City, Mo.

Factory Representative
R. R. COLE, *Vice President*
Roosevelt Hotel
New Orleans
Natural Gas Convention

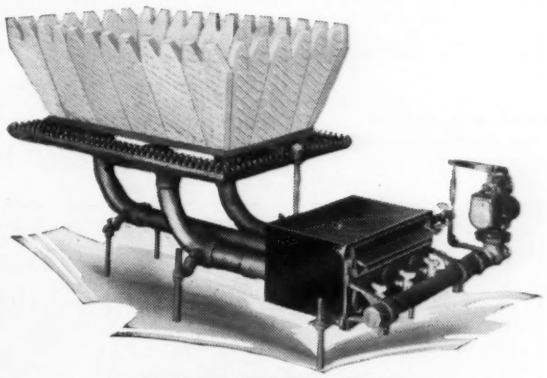
SECURITY CIRCULATOR SPACE HEATERS
3 Styles and 5 Sizes

"All That the Name Implies"

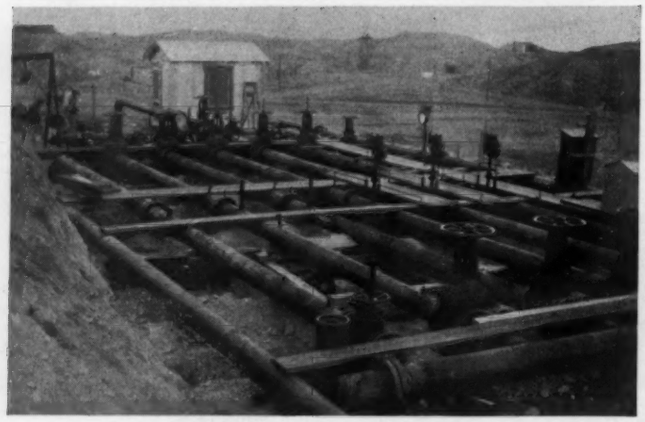


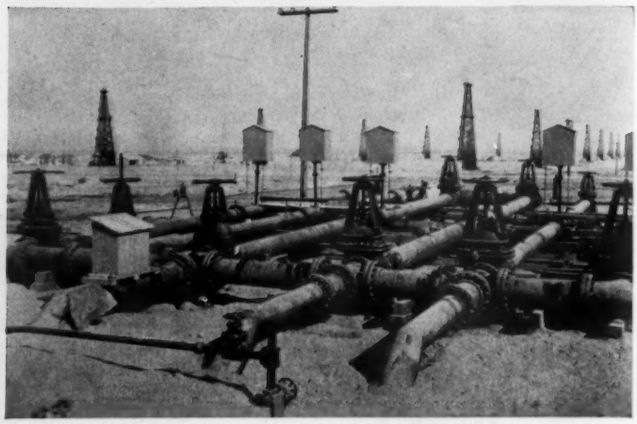
SECURITY WARM AIR FURNACES
2 Styles and 3 Sizes

Our New Catalogue Now Ready Will Be Mailed On Request



SECURITY RECTANGULAR CONVERSION BURNER
Made in 3 Sizes





Measuring stations on Southern California Gas Co. Line. Left—Station at Kettleman end (origin). Right—Buena Vista Hills station.

Practical Field Methods Speeded This Line

ture tended to thicken the paint so that the spray guns became inefficient. However, by running the hot water from the gas engine jackets through a coil in the paint tank, this condition was entirely overcome.

The application of the protective coating by means of spray guns was a new departure, and several different brands of paint were used. It is of interest to note our experience with this operation. Advantages of the spray gun method can be briefly summarized as follows:

(1) More uniform application,

(2) Greater speed in application,

(3) Less waste of material.

The disadvantages were found to be about as follows:

(1) Certain of the protective coatings are too viscous to pass the spray nozzle at normal temperatures, while others clog at low temperatures.

(2) Wastage of material is materially increased by high winds.

(3) Injury to the operator, either external or by inhalation, may result by spraying if the paint contains harmful ingredients.

In the design of equipment for spray application, due consideration must be given to the mobility of the unit, the pressure and volume of air, number and capacity of the nozzles to be used—and it is suggested that these factors be determined by preliminary experiments with the various types of paint to be used.

Wherever wrapping was considered necessary, a wrapper was used after the primer and the first protective coating had been applied. This wrapper is approximately 6

(Continued from Page 86)

inches wide and furnished in rolls. It was applied by two men, one on each side of the pipe passing the roll back and forth and rolling the wrapper evenly and tightly around the pipe. The third protective coating was then applied over the wrapper.

A preliminary test, using 100 pounds pressure, was applied to the pipe after sections approximately 1 mile long had been completely welded on top of the ditch. For convenience, special test heads (See Fig. 4) were provided to facilitate the testing operation. These test heads consisted of a hinged clamp, or collar, secured around the pipe immediately behind the bell end and having a flange which is drilled for eight flange bolts. To this is secured a blind flange having a diameter larger than the 20-inch pipe and with a circular recess cut on one side to fit the bell end of the pipe and eight bolt holes drilled for the flange bolts. Hydraulic packing is inserted in the recess in the blind flange and provides a gas-tight joint suitable for the initial test. A 2-inch nipple end valve is attached to the blind flange and serves to apply the necessary pressure.

Twenty-four hour recording pressure gages were connected to each section subjected to the initial test pressure of 100 pounds, and recorded any variation in pressure during the test. An inspection of both field and mill welds was made with soap suds. An average of about one leak per mile was found as a result of this test. Upon completion of the test in one section, pressure was released from the section under test into the next section about to be tested, thereby utilizing to the fullest extent the pressure from one section into the next section.

Lowering in of the line was accomplished by means of a swing boom on a caterpillar tractor equipped with a suitable sling to prevent injury to the protective coating.

In order to test the strength of the field welds, coupons were cut at regular intervals from rolling welds and from tie-in welds and in almost every instance the coupon under test broke outside of the weld and in those cases where the weld did break the indicated tensile strength was usually higher than the average tensile strength of the pipe material.

Following the cutting of coupons and after having been lowered into the trench, sections of approximately five miles were given a thorough blow to clear all foreign matter, dirt and debris from the line.

Upon completion of the backfilling and as rapidly as each section was completed between main line shut-off valves, a final pressure of 400 pounds was applied, and to facilitate inspection and the detection of possible leaks a small amount of odorant was added to the gas. Inspectors walked the line during the 400-pound test, and recording pressure gages on the line indicated any change in pressure during the test.

Sixty-eight and nine-tenths miles of 20-inch pipe were laid from the measuring station at Kettleman Hills to the Buena Vista Hills Terminal near Taft in 78 days welding time, or approximately at the rate of 4,700 feet per day.

The first shipment of pipe was received on October 22, 1929, and on December 9, 1929, the last length of pipe was delivered on the pipe line right-of-way. Backfilling was started on November 21, 1929, and on January 30, 1930, 71 days later, the entire pipe line had been completely backfilled. With the exception of about two weeks of fog and rain and two days of snow, the weather was ideal for pipe line construction.

The construction of this line was done in what can be termed record time and was only possible through the wonderful cooperation of all of the contractors involved in this work, as well as the gas company's personnel directly responsible for its execution. Many features of this construction were new, both as to materials used and methods employed; the results have been most gratifying and indicate a decided advancement in pipe line construction.

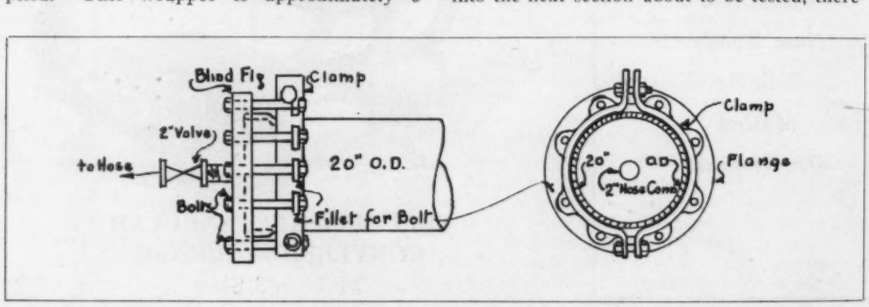
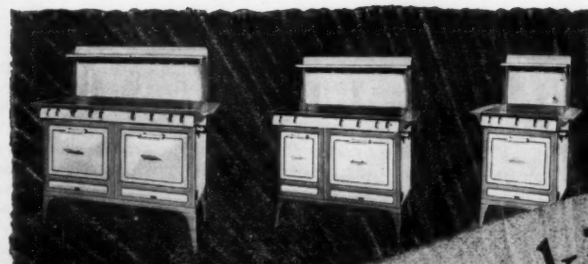


Fig. 4. Test Head Assembly



A size for every kitchen and every cooking need

Exclusive cooking advantages...

Bigger Profits

Creating a new *exclusive* Gas Range Market

Smoothtop, with a new, more convenient cooking principle, is making gas range history. Smoothtop's new cooking advantages have created a fertile market among the housewives and the best cooks of your city. And, once you're carrying Smoothtop, you become an exclusive dealer. When you've sold a woman on Smoothtop she can't go shopping and buy it around the corner.

And a specialty profit

...which we help you get with a substantial national advertising campaign featuring the Smoothtop slogan, "Captures the flavor... frees the cook" ...with local newspaper advertising helps, floor displays, window displays and cooking schools ...with an opportunity for free training of your staff in up-to-date retail and house-to-house salesmanship.

Act while dealership is open!

Write for complete merchandising set-up to Standard Gas Equipment Corporation, 18 East 41st Street, New York City. Makers of... Smoothtop ... Oriole ... Acorn ... Vulcan ... the standard domestic and heavy-duty gas ranges wherever gas is used. Pacific Coast Distributor: Northwest Gas & Electric Equipment Co., Portland, San Francisco, Los Angeles.

Smoothtop

GAS RANGE

CAPTURES THE FLAVOR . . . FREES THE COOK

New Cabinet-Type Heater Introduced *by* Payne

ANNOUNCEMENT is made by the Payne Furnace & Supply Company, Inc., of Beverly Hills, California, of its entrance into the space heating field with a cabinet-type heater of new design. Heretofore, this company has confined its efforts to the manufacture of gas-fired furnaces, in which field it has specialized for the past 14 years.

The new Payne offering is known as the Payne Console Heater and its principal distribution will be through gas companies and retail outlets in the home furnishings field. It is of the warm air circulating type and is supplied in two sizes.

The exterior follows the modern trend in decorative design and finish, as seen in the furniture and radio fields. Finished in natural wood grain, the heater resembles a modern piece of home or office furniture, and features of its interior construction permit it to be used as such, even when it is in use as a heating device. Due to the rapid heating of the Payne multiple heating element and the employment of double wall insulation, the temperature of the top and sides is kept low enough to allow the heater to be used as a stand or occasional table.

According to E. L. Payne, vice-president and general manager of the Payne Furnace & Supply Company, Inc., experiments and tests extending over a period of nearly two years have been under way, to adapt the multiple heating element principle employed in the manufacture of Payne gas furnaces to a small cabinet-type space heater which could be marketed at a cost within the purchasing range of smaller residential and commercial consumers.

A point stressed in connection with design features of the new line is that the heater will not be removed during the non-heating seasons but will always be available both as a room ornament and as an emergency source of heat for cool nights during the summer, and to keep home or office warm during frequent cold spells that occur in the late fall and early spring.

The heating element is made of rust-resisting ingot iron, welded at seams and joints to prevent gas fumes from leaking into the wam air passages and fouling the atmosphere in the room. Circular warm air passages extend through the center of the rectangular fire-box, which is baffled to insure every available heat unit being utilized before the burned products of combustion leave the heater through the vent.

The heating element is surrounded by a galvanized outer casing. A specially constructed hood over the top of the heating element directs the heat out through an open grille at the top of the front wall of the heater. Between the outer casing and the outer walls of the cabinet is another air space which keeps the heating element from warming up the outer side walls of the heater.

Payne Console Heater shown in domestic setting.

The smooth, flat top is removable and is heavily insulated, making it unnecessary to remove books, bric-a-brac, lamps, vases, flower bowls or other ornaments that may be placed there to decorate the room.

The heater directs a lazy stream of freshly warmed air into the central areas of the room, where it rapidly diffuses. As partially cooled air settles to the floor it is drawn into the heater and again re-circulated. The heater extends close to the floor, and does not produce a wide current of cold air across the floors.

Sample heaters are now being shipped to gas companies throughout the country.

CHANGES IN ARKANSAS NATURAL PERSONNEL ANNOUNCED

Stanley Grise, formerly manager of the Arkadelphia, Arkansas, office of the Arkansas Natural Gas Company, has recently been transferred to Gurdon, where he assumes the managership of the local office

F. E. Larkin of Gurdon has been appointed to take charge of the Magnolia, Arkansas, office, replacing J. K. Sales, who goes to Hope as manager, succeeding J. J. Martin, who is now located with the Little Rock property.

O. G. CORNS NAMED DIRECTOR OF BYLLESBY COMPANY

John J. O'Brien, president of H. M. Byllesby Company, announces that O. G. Corns, vice-president, has been elected a director in the company. Mr. Corns has been associated with the company since September, 1915, and was elected a vice-president in 1926.

J. F. McQUILLIN NEW BUSINESS MANAGER AT SABETHA

Announcement has been made of the appointment of John F. McQuillin as new business manager of the Gas Service property at Sabetha, Kansas. Mr. McQuillin was formerly a member of the new business department of the Wyandotte County Gas Company, of Kansas City, Kansas, of which Jack Torbert is in charge. F. M. Rosenkrans is general new business manager of the Gas Service properties.

HARTZELL OF K. C. GAS CO. GOES TO DOMINION NATURAL

Ralph E. Hartzell, associated with the advertising department of the Kansas City Gas Company for the past two years, has accepted a position as advertising manager of Dominion Natural Gas Company, Ltd., a Doherty company operating in New York State and Ontario, Canada.

OZARK DISTRIBUTING COMPANY APPOINTMENTS ANNOUNCED

Harry Siebenthaler, manager for the past year of the Carthage Gas Company, Carthage, Mo., has been appointed as manager of the Ozark Distributing Company, according to announcement. The Ozark properties include all of the towns in which gas will be served along the new Springfield line of the Cities Service Company.

These towns include Neosho, Peirce City, Marionville, Monett, Aurora, Republic and Billings. Distribution systems at Neosho, Peirce City, Marionville, and Monett have already been completed.

A. H. Maeder, formerly district superintendent for the northern group of towns operated by the Western Distributing Company, has been appointed as superintendent of the Ozark Distributing Company.

Other appointments include Ralph D. Ford, formerly chief clerk of the Union Public Service Company at Ottawa, to the post of manager of the Carthage Gas Company. W. R. Phillips has been appointed to the position vacated by Mr. Ford.

ANNUAL FIRST AID MEETINGS TO BE HELD AT S. F., MAY 14-16

San Francisco will be the scene of the 8th Annual California Industrial First Aid Meet, and 7th Annual Pacific Coast Safety Conference on May 14, 15, 16, 1930. Headquarters for the conference have been established at the Palace Hotel, San Francisco. The First Aid Meet will be held at the Scottish Rite Auditorium.

Speakers at the Conference will deal mainly with the subject of industrial safety. As a new departure the Industrial First Aid Meet will include teams representing California industries and also industries from outside of the State. The contest will be held this year in the evening instead of the afternoon, as has been the custom in the past, to enable all of those interested in first aid to attend.

Both the Safety Conference and the Industrial First Aid Meet are under the auspices of the California Safety Society.

MEETINGS TO FEATURE TALKS ON DEPARTMENT OPERATION

Under the direction of H. L. Montgomery, general manager of the Cities Service Gas Company at Bartlesville, employees of the company recently inaugurated the plan of having regular monthly meetings at which the employees are trained in the activities of various departments.

An employee is placed in charge of each meeting to present and discuss topics related to the operation of his department.

BERGHORN REPORTS 60 PER CENT EXHIBIT SPACE TAKEN

On March 27, C. W. Berghorn, director of exhibits for the American Gas Association, reported that over 60 per cent of the exhibit space available for use during the annual convention of the Association had been disposed of. The 12th Annual Convention of the American Gas Association will be held at Atlantic City on October 13-17, 1930.

ROBERTS-GORDON CO. PUBLISHES BROCHURE ON ADVERTISING

Roberts Gordon Appliance Corp., of Buffalo, N. Y., recently brought from the press a 28-page booklet entitled "Sell Health and Comfort in the Home." The brochure is being mailed to sales executives in the gas industry and contains typical Roberts-Gordon advertising together with a brief outline of successful selling methods now employed in the gas industry.

A THERMOSTAT *as* POSITIVE *as an* Electric Light Switch

The No. 500 Thermostat

An attractive, sensitive, dependable room temperature control.

The No. 500 Thermostat

with outer plate removed, showing the snap action blade.

Time-O-Stat's No. 500 Room Thermostat operates as decisively and dependably as a light switch! Its snap action blade makes and breaks circuits with a *definite* action, preventing arcing and pitting of contact points caused by slow circuit breaking. The snap-action blade never sticks or drags or fails to make contact. This is an important Time-O-Stat feature.

Because of this snap action principle, the Time-O-Stat No. 500 Room Thermostat gives accurate, reliable control of temperature without service or maintenance cost. Because of its extremely sensitive bimetallic element it maintains room temperature within a variation of 1° F. Its full jeweled Seth Thomas eight day clock provides dependable time control of temperature. Beautiful in design, it is available in statuary bronze or chromium finish.

The No. 500 Room Thermostat is an important instrument in Time-O-Stat's well known line of automatic controls . . . All have been perfected in Time-O-Stat research laboratories . . . They form the most complete and dependable line of controls for the gas industry. Send the attached coupon for detailed information.

TIME-O-STAT AUTOMATIC CONTROLS

TIME-O-STAT CONTROLS COMPANY

ELKHART, INDIANA

Branch Offices and Exclusive Distributors in All Principal Cities of the United States.

Export Department: New York.

Canadian Distributors: Toronto and Montreal.

Manufacturers of AUTOMATIC CONTROLS *for all types of Burners — Electric Refrigerators — Furnace Fans — Industrial Ovens — Ice Machines — Unit Heaters . . . also of Sign Flashers — Mercury Switches — Electric Heaters — Corrugated Metal Bellows.*

TIME-O-STAT CONTROLS COMPANY Dept. 2
Elkhart, Indiana.

Send me, without obligation on my part, full details and descriptive literature.

Name.....

Address.....

Company.....

Natural Gas—Unique Among Utilities

(Continued from Page 51)

scope. Certainly these recent years have witnessed an extension of natural gas service into the public utility field that could not have been foreseen at a date as late as 1925.

Structural Changes

As a consequence of this era of rapid expansion, the characteristics of the business structure of the industry have undergone changes quite as radical as those that have marked its physical progress. An outline of characteristics of the business up to the time that these changes began to take place will be helpful in appraising their effect and in appreciating their extent. In the earlier period, and by the earlier period is meant the development phase prior to 1925, the men identified with the gas business and responsible for its operation were largely recruits from the ranks of the oil industry and as such had little or no experience with the practical phases of public utility operation. This condition was a natural one. Gas was discovered and produced by the same methods used in the discovery and production of oil and the discovery and production of gas, insofar as the development of new sources of supply was concerned, had been the result of the search for oil and not the result of any deliberate effort to secure the production of gas itself. Due to its flexibility, cleanliness, and ease of control, natural gas was quickly recognized as an ideal fuel for both domestic and industrial uses, but, as the result of certain inherent characteristics that controlled and limited its practical utilization, the incidenal or isolated discovery of gas carried with it none of the economic interest that surrounded the discovery of oil under similar conditions. Gas could not be stored. Its utilization depended upon a continuous process from the moment of its release from its natural reservoir up to the time of its delivery to the consumer's burner. There was only one method by which this delivery could be made, the use of pipe as the transportation agency. Its ultimate utilization was definitely confined to a stationary market. The vast fuel market created by things that moved under their own power could not be served. Therefore, for a discovery of natural gas to have any consequent value, other than as a fuel for local field operations, a certain definite combination of circumstances had to attend the discovery. A market had to be available within definite geographic limits, a supply had to be developed within a rather circumscribed area, and capital had to be available in substantial amounts for the promotion of an enterprise that carried with it the hazard of incipient failure.

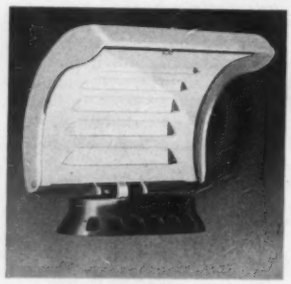
It is quite evident, in view of the conditions outlined, that the pioneers of the natural gas industry did not go into the business through any predetermination on their part but rather as the result of a combination of circumstances over which they had no control. If the oil operators within a given area developed a natural gas supply that gave indications of having sufficient volume to justify the construction of a pipe line, and if a good market was fairly close at hand, naturally these operators turned their thoughts to the possibilities of the profitable utilization of a product that, unused, would become more or less of a nuisance. After the illusion that any given gas supply was inexhaustible had been dispelled, it is very doubtful if any very serious thought of comparative permanence or extended public service accompanied the earlier natural gas pipe line projects. These men were simply attempting to profitably dispose of a rather irritating by-product of the thing in which their major interest lay. They sought the simplest and most direct means of making this disposition. They had no particular desire to extend their operations into the active field of public utility service, with its complex and annoying public contacts. Large industrial sales held the greatest appeal, and such sales as were made for re-distribution were made wholesale to the independent operators of distribution plants.

This particular phase of the industry's development might well be termed the era of wasteful utilization. Competitive field conditions were conducive to hasty withdrawals. No thought was given to the application of proper rate forms, and the crude schedules of these early days encouraged extravagant use on the part of all classes of consumers. In fact, the whole atmosphere of the business was that of something temporary and unsubstantial. A business of this nature made no appeal to the independent investor, nor was his money solicited for participation in it. The uncertain life-expectancy of any particular project rendered the issuance and sale of bonds to underwrite any part of the construction cost, a fiscal policy of such a doubtful nature that it was rarely used. The producers themselves, or a group of individuals closely associated with them, furnished the capital with which they launched these earlier ventures.

Building for Stability

As has been pointed out, the discovery of gas has no particular economic value *per se*, but once the facilities for its transportation have been provided and a market for its utilization has been secured, the economic aspect of the situation becomes changed. The production of gas adjacent to a pipe line serving an active market has intrinsic value, either for current use or for the purpose of building up a reserve supply, and because of this fact the natural gas business changed from an orphan left on the doorstep of the oil industry into the independent, virile business that it now is. While the original natural gas pipe line projects were constructed to utilize an incidental product of oil development, these original sources of supply were subject to an inevitable decline in both volume and pressure. If service was to be maintained new wells had to be drilled. The drilling of these wells for the specific purpose of producing gas for ultimate delivery to a specific market definitely marked the point where the natural gas industry ceased to be a by-product.

The next step followed in logical sequence. When the drilling of more wells and the installation and operation of compressors could not deliver an adequate supply from the original fields, the operators of a property in this situation were confronted with the abandonment of service and the salvaging of



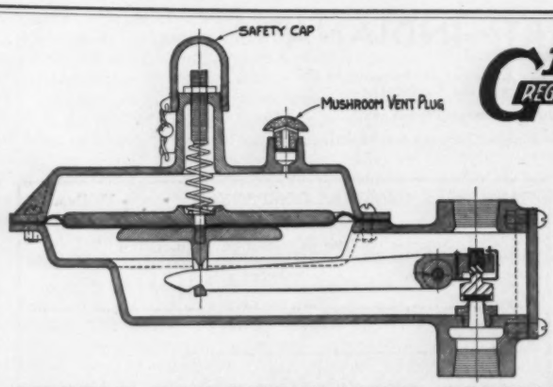
ABSORBS GREASE
MONOFLECTOR
DEFLECTS HEAT

KEEPS WALLS CLEAN

CLOSED OPEN

The hinged Louvred front opens for removal of the absorbing pad and general cleaning. A single vise-like clamp holds it to any collar. Its all-enameled finish and style allow it to blend with the best of gas ranges.

MONARCH PRODUCTS CO., Inc.
434-436 N. Front St., Baltimore, Md.
C. B. Babcock Company, Pacific Coast Representatives.



GROBLE
REGULATORS & GOVERNORS

The Groble No. 1 Service Regulator with or without Dead Weight Safety Valve, made with ¾", 1" and 1¼" Inlet and Outlet Connections.

GROBLE GAS REGULATOR COMPANY, Anderson, Ind.

Selling Radiant Heat

A Practical Page for Appliance Salesmen

No. 5

Reach For a Dollar Instead of a Dime

The new No. 95 Radiantfire is quality merchandise, yet not at all expensive. There will be many homes where it will just fit the needs and the pocketbook.

That is one way of saying, put forth your first and strongest effort to sell quality merchandise. Too many of us, harried by the fear that we may lose a sale, start letting the customer down easy the minute the interview opens.

Don't worry about the low priced merchandise—it will keep and can always be turned to as a last resort. Would a Lincoln salesman start working on a prospect by showing him first his stock of used Fords?

To be specific, here is a thought in the selling of Radiantfires. A thought that "reaches for a dollar instead of a dime." Dollar bills may blow away, but the dime will generally wait.

When you are in the home of a prospective purchaser of a gas fireplace heater, look around you and quietly appraise the taste that has been shown in various articles of home decoration. The furniture, the plan of the room, the pictures, any one of a dozen things may be worth mentioning. Praise the things that are worth praising—be enthusiastic yourself. And above all: Don't lay it on too thick.

And then, when the time comes to recommend a heater, you have one of the Humphrey Radiantfire models that was actually designed to fit right into the decoration scheme of just such a room.

By noticing the other furnishings of the room, you have achieved for yourself the position of an authority. Your advice and suggestions will mean something. And you will have the satisfaction of making a sale of quality merchandise instead of a cheap installation, recommended just to get by.

The HUMPHREY Radiantfire

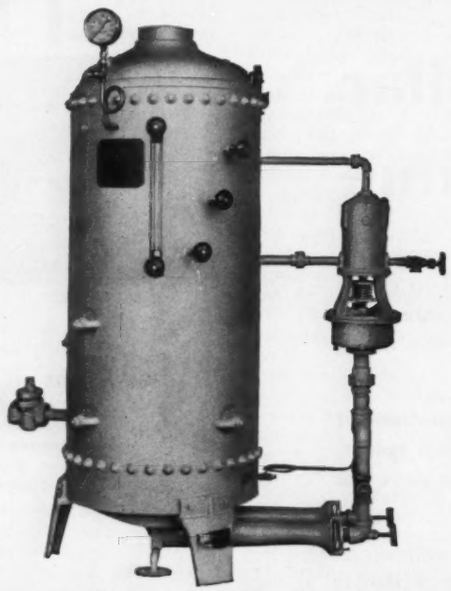
TRADE MARK REG. U.S. PAT. OFF.

Pacific Coast Manager
C. B. Babcock
135 Bluxome St.,
San Francisco

Manufactured by
General Gas Light Co.,
Kalamazoo,
Michigan

Automatic Gas Fired Boilers

LATTNER



All Sizes from ½ to 30 H. P.

P. M. LATTNER MANUFACTURING CO.

Factory
516 12th Avenue
Cedar Rapids, Iowa

Warehouse Distributor
2646 South Hill Street
Los Angeles, California

A Heater that Will Deliver a Gallon of Hot Water for Every *1 Foot of Natural Gas.*

THE heater is finished in lustrous enamel.

300-lb. test copper-bearing Steel tank.

New Efficient Insulating Material.

Safety Pilot.

Combination Safety and drain valve.

2 sizes: 25 gal.—40 gal.

Pittsburg Monarch Automatic Storage Water Heater

Made in 2 Sizes
25 Gallons—40 Gallons

Pittsburg Water Heater Company

Offices at:

478 Sutter St.
San Francisco

2010 Jackson St.
Dallas

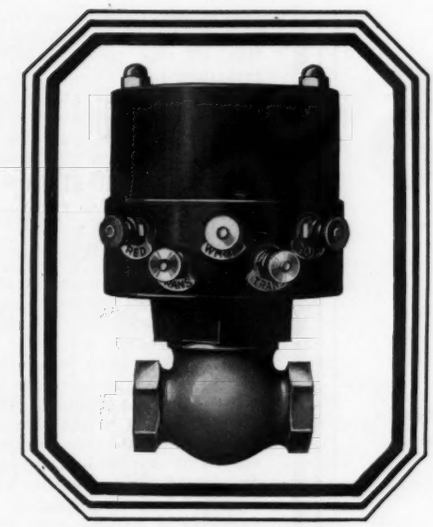
242 So. Western Ave.
Los Angeles

such part of their investment as might be recovered, or the construction of new lines to new sources of supply. If these new sources of supply had been developed and were commercially available, the lines were extended and service maintained. This was a process in which repetition was certain. With a constant market, the normal decline in production that resulted from gas withdrawals would, from time to time, create a necessity for the acquisition of new reserves. With a rapidly expanding market the process was accelerated and the physical layout that is so characteristic of the older natural gas companies has been the result of these periodic extensions. As these extensions were made in various gas producing areas, production was stimulated by the market thus provided and the pipe line companies gradually secured the benefits of a wide diversity of supply that provided comparative stability and longevity to a business that in its earlier stages had depended upon the limited resources of one field.

The past and the present are comparatively easy to picture, and upon these we can build some idea of the future. With the extension of these lines into the various producing areas, and the stabilizing of the markets, the companies have not only placed themselves in a position to secure their supplies from the sources that have been defined up to this time, but have acquired a strategic position for the acquisition of the hitherto undiscovered natural gas resources that the laws of probability and chance assure.

This outline traces the trend of the business up to about 1925. The various pipe line companies had grown to large institutions, but the growth that they had attained, both in the matter of supply and marketing lines, had been the result of annual accretions. They received their gas from numerous, and quite frequently widely scattered sources of supply, and their marketing lines formed networks that covered their distribution territories. This form of development that has been characteristic of the older companies may be quickly recognized by a glance at a map of the natural gas pipe line systems. The companies were still largely controlled and operated by the men who had been responsible for their development up to this time. The extent of their resources and their comparative stability furnished the basis for methods of financing that the uncertainties of the early days had rendered impracticable; nevertheless they were, in the main, still financed by the sale of their shares to a limited group and by the re-investment of their reserves.

The great bulk of the sales of these companies was still made to large and individual industrials and to independently owned distribution properties upon a wholesale or city-gate basis. The owners of the producing and transportation companies, had, up to this time, very generally maintained their original hands-off policy in the matter of local distribution, a phase of the business that involved intimate public contacts and with them a degree of supervision and regulation that was inherently distasteful to the type of men who were engaged in the extremely hazardous undertaking of producing and transporting natural gas. A combination of circumstances brought about a change in this attitude. In the areas served by the marketing lines, there were located a large number of small communities that could easily be reached by the construction of short taps from the main trunks. In the aggregate, the volume of business that could be secured from this source provided a tempting market. Individually, the towns were too small to attract



We invite

a 2 minute study

of the TEEPLE *electric gas valve*

Here is a fact presentation of the Teeple Valve—the greatest development in the gas valve field:

1. It consumes only 3 to 4 watts (at 10 volts) permitting its use on small doorbell transformers.

2. Operation is satisfactory on any voltage of from 10 to 18 volts, and this range covers practically all makes of bell-ringing transformers. This flexibility eliminates troubles from low line voltage or poor regulation.

3. Thermostat may be located at almost any distance from valve without making the use of a larger transformer necessary. The valve will operate properly even though thermostat is 800 feet or more distant.

4. Low current consumption of the valve eliminates burned contacts, even after long use.

5. Motor unit can be stalled indefinitely without injury to valve or transformer. Wrong thermostat connections cannot cause damage.

6. The motor drive makes surplus power available, giving a high factor of safety.

7. Reserve power makes operation possible on any gas pressure found in domestic use.

8. Bell-ringing transformers commonly found in homes are adequate to supply valve. Saves time, labor and expense in installation.

9. Method of wiring valve has been simplified by using five terminals. Three connect direct to thermostat—two to transformer.

10. Operation is positive and dependable, and eliminates possibility of chattering.

11. Sizes—½ inch, ¾ inch, 1 inch.

12. Prices compare favorably.

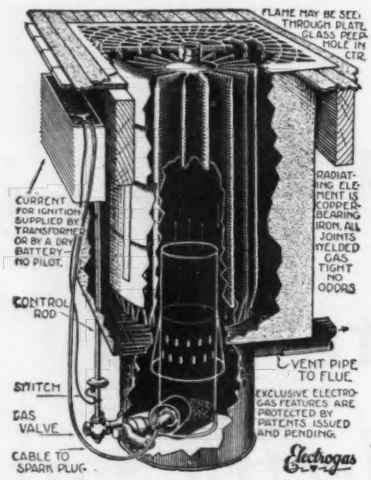
The Teeple valve is fully explained in an interesting folder just published, a copy of which will be gladly sent to you upon request. Write the L. R. Teeple Company, 540 East 9th St., Portland, Oregon.

TEEPLE

ELECTRIC GAS VALVE

Electrogas

FLOOR FURNACES


FLAME MAY BE SEEN THROUGH PLATE GLASS PEEP HOLE IN CTR.
RADIATING ELEMENT IS COPPER BEARING IRON. ALL JOINTS WELDED GAS TIGHT NO ODORS
CURRENT FOR IGNITION SUPPLIED BY TRANSFORMER OR BY A DRY BATTERY—NO PILOT.
CONTROL ROD
VENT PIPE TO FLUE
SWITCH
GAS VALVE
EXCLUSIVE ELECTRO-GAS FEATURES ARE PROTECTED BY PATENTS ISSUED AND PENDING.
CABLE TO SPARK PLUG
Electrogas

The original electrically ignited furnace.

Hollow, streamlined fins offer unusual efficiency.

Fool-proof

available in four sizes:
20,000 BTU
25,000 „
30,000 „
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also in Cabinet type.

Electrogas, now in its tenth year, has won a reputation for efficiency, freedom from servicing, and all-around satisfaction which is second to none. It will pay you to handle this remarkable appliance.

ELECTROGAS FURNACE CO., Rialto Bldg., San Francisco

ATTENTION! Commercial Members Gas Companies

A Spic and Span gas stove is a credit to the house-wife and can be kept that way by the use of

Removes Grease

DOUBLE DUTY
REG. U.S. PAT. OFF.

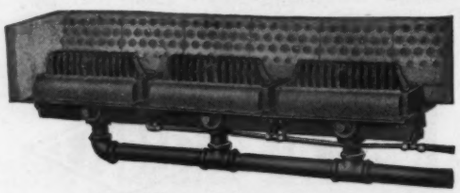
Prevents Rust

GAS RANGE & STOVE CLEANSER

WALMAR LABORATORY Oshkosh, Wisconsin

Western Distributor
C. B. BABCOCK CO., San Francisco, Los Angeles

R. M. C. Gas Burner



Durable Safe Economical

ROTARY MANUFACTURING CO.

5720 Long Beach Avenue **Los Angeles, California**

capital for the construction and operation of plants solely for the purpose of re-distribution. If this market was to be secured, it remained for the pipe line companies themselves to construct and operate these plants, and this they proceeded to do upon a wholesale basis. This was the entering wedge, but other and more potent factors contributed to the rapid shift in policy that was now to take place.

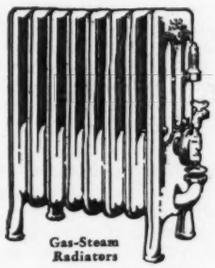
Consolidation

The fixed investments of the pipe line companies had become very large and these investments had been made for the purpose of serving specific markets. The control of these markets quite naturally became a matter of vital importance and the logical method of maintaining this control lay in the ownership of the facilities for distribution. The reluctance to enter a new field of operation that had previously restrained the owners of the production and transportation agencies was overcome by the obvious advantages of common ownership, and the past few years has witnessed the wholesale acquisition of local distribution plants by the major pipe line companies. The practical results of these consolidations have been extremely beneficial from the standpoint of the public interest as well as that of the companies themselves. The responsibility for service has become centralized, the conflict of interests that continually arose when the transportation and distribution agencies were separately owned has been removed, and by the stabilization of the markets the more remote sources of supply may be developed with greater assurance.

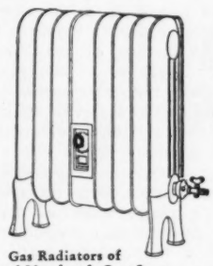
Capital Turns its Ear

What has been said up to this point traces in a very general way the successive steps that marked the development of the companies that, for want of a better term, have been designated as the pioneers of the industry. Within the past six years a new influence has been at work within the industry—that supplied by investment capital. Financial interests have yielded their attention to the attractive possibilities of natural gas, have glimpsed the wealth of gas reserves, and have made capital available for linking them to potential market areas. The traditional course of growth, by gradual addition of new territory to established gas systems, has thus been supplemented. We now witness natural gas developments which spring full born into service of distant markets through pipe line projects originating in proven gas areas. Today the investment banking fraternity numbers the natural gas industry on its preferred list, and the enterprises in which investment capital has been a factor are multiplying.

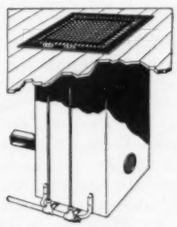
This highly desirable attitude of capital towards the needs of the industry has resulted from its early participation in a few successful projects which blazed the way for numerous other transmission undertakings. Of these earlier significant forerunners among pipe line projects utilizing investment capital we may mention the bringing of natural gas to the Houston, Texas, area as a case in point. With gas purchase contracts and independent gas rights in the Refugio fields, and preliminary negotiations with potential customers in the Houston area as a starting point, W. L. Moody III and O. R. Seagraves late in 1924 attacked the problems of securing funds to construct a 150-mile line. They persuaded a group of investment bankers, who had no previous contact with the natural gas business, to underwrite an issue that provided the funds for the construction of a 16-inch line from



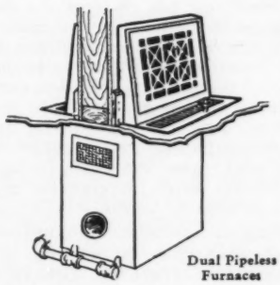
Gas-Steam Radiators



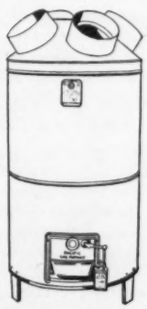
Gas Radiators of Pressed Metal and Cast Iron



Pipeless Floor Furnaces



Dual Pipeless Furnaces



The New Perfected Pacific Gas Unit Furnaces

Recessed Wall Heaters

Hook Up with the

Gas-Heating Headquarters

of the West

SUCCESS in selling gas-heating appliances does not require contact with a dozen manufacturers. If you come to "Gas-Heating Headquarters," you can get every gas appliance you need from a single source—the largest and oldest gas-heating organization in the West.

With a Pacific Gas Agency you are more efficient, because you understand one line better than the products of many firms. Your guarantee means more because you are working closely with us. You thoroughly understand the Pacific Gas Guarantee, and we back you up.

Find out about this simpler way to gas-heating success. Write for full details of our attractive dealer proposition.

Pacific 5-Column Gas-Steam Radiators

Whether the job requires one unit or a thousand, the Pacific Gas-Steam Heating system meets the need. Each unit is independent of all others, supplying comfortable steam heat at the turn of a valve. The beautiful 5-column radiators have instant appeal. Used in finest homes and institutions.

Pacific Gas Radiators

These warm air units are simple, compact, durable, quick-acting, and economical. Two types—pressed metal construction for homes, apartments, etc.; heavy cast iron construction for larger buildings.

Pacific Gas Unit-Furnaces

Here is the perfect warm-air heating system. Fits any size building—simply use enough units to supply required number of outlets. Electric or manual control, or with automatic heat regulator. Long-lasting. Trouble-proof.

Pacific Floor Furnaces

Scientific design, with sealed combustion chamber and outside vent. Heavy cast iron heating dome assures perfect uninterrupted heating service for many years.

Pacific Fireplace Radiant Heaters

The Pacific New Feature Burner provides complete combustion with any type of gas, without need of adjustment. Many sizes, styles, and finishes.

Pacific Automatic Water Heaters

The Pacific Line of Water Heaters is the most saleable you've ever seen. Both instantaneous and storage types. Storage heaters have center heating flues and outside shell of boiler also used as heating surface. Efficient, well-insulated, economical, with positive thermostat control. A size and type for every purpose.

Pacific Gas Radiator Company

Gas Heating Headquarters

Roseberry and Walter Sts., Huntington Park, Calif.

Write us about the attractive Pacific Gas Agency proposition for your territory

The BARTLETT HAYWARD CO.
BALTIMORE *Engineers and Founders* NEW YORK

DESIGNERS AND BUILDERS
– OF –
COMPLETE COAL GAS PLANTS
CARBURETTED WATER GAS PLANTS
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DE BROUWER CHARGING AND
DISCHARGING MACHINES
SALT WATER AND FRESH WATER
CONDENSERS
PURIFIERS
SHAVING SCRUBBERS
CENTRIFUGAL VERTICAL TYPE
SCRUBBERS
STEEL TANKS
VERTICAL WASTE HEAT BOILERS

GAS HOLDERS

Refugio to Houston. The success that attended the marketing of this issue did much to awaken the interest of the underwriting fraternity in a field of investment that had hitherto escaped its notice, and this awakened interest has had a far reaching effect upon the recent trend of natural gas developments.

Present pipe line projects are often supported by complex financial structures that were never dreamed of a few years ago, financial structures that are in most cases completely fabricated before any actual construction has taken place.

This last phase of development has also been characterized by a marked difference in the physical layouts of the recent projects compared with those of the preceding era. The systems of the older companies are two-dimensional. They cover wide marketing areas that have been developed through a process of gradual acquisition. These new projects are very largely one-dimensional in that they go direct from the source of supply to some large terminal market. It is interesting to note this distinction by an inspection of a map of the natural gas pipe line systems of this country.

Reserves for Future

Current development of the natural gas industry is predicated upon the presence of proven gas reserves assuring future supplies in volume that would have staggered the imagination of gas men a few brief years ago. The Southwest has occupied a favored position in the matter of gas reserves, and because its resources are so greatly in excess of its current market needs the Southwest has provided the starting point for major projections into large terminal markets. Other such enterprises are in the offing, to utilize gas from the Southwest. But even in the matter of gas reserves the industry is taking on a national complexion. The Mountain States are yielding discoveries of rich gas resources, which are already serving some of the larger population centers in this section; proven gas areas on the west coast, as yet practically untouched, assure a permanency to natural gas operations of that populous area; over the northern boundary lie the Alberta fields, to give the gas supply an international flavor.

The work of linking markets to these supplies now proceeds by sure steps, in which is reflected the experience already gained in gas transmission over long distances. Such projects have earned the confidence alike of investors and public, stamping the natural gas utility enterprise as one having a widening scene of action.

ELECTROLUX REFRIGERATOR SALES NAMES DEALERS

Electrolux Refrigerator Sales, Inc., of Evansville, Indiana, announces the appointment of the following companies and dealers to handle its products: Palestine Light, Heat & Power Co., Palestine, Texas; Union Gas Corp., Independence, Kan.; Natural Gas Distributing Co., Hebron, Neb.; Central Power Co., Hastings, Neb.; Missouri Natural Gas Co., Poplar Bluff, Mo.; Southern Cities Distributing Co., Shreveport, La.; Fort Worth Gas Co., Fort Worth, Texas; The Lang Company, Salt Lake City, Utah; Arkansas Natural Gas Corp., Little Rock, Ark.; G. W. Zink, Roswell, N. M.; Donehoe-Ware Hardware Co., Plainview, Texas; Sitter Furniture Co., McLean, Texas; N. M. W. Store, Higgins, Texas; Stanton Hardware Co., Stanton, Texas; L. L. Collins Co., Dougherty, Texas; Thompson Hardware Co., Canyon, Texas; Utility Supply Co., Salina, Kan.

SHE WANTS MORE COMFORT

Sell it to Her

SHE wants more health and comfort in her home. She wants more leisure to devote to her children. She needs more time to spend in constructive home making. She wants emancipation from the slavery of furnace tending.

She can have all these—if gas is the fuel in her home.

You have the opportunity to lighten the household cares of every woman in your territory—by selling gas for home heating. And the logical—economical method of burning gas in the home is by means of the Roberts Controlled Gas Heating Unit. Automatic from start to finish. Clean, noiseless, simple—Roberts spells perfection in home heating by gas.

Now is the time to start selling gas for home heating. To aid you in your efforts—we have prepared a simple and logical plan. The complete plan is simply told in the new book entitled, "Sell Health and Comfort in the Home." A copy is yours for the asking.

Send for this book now

This brand new book—just published in the interests of the home heating department of your gas company—contains twenty pages of constructive information. Your copy is waiting your request—and of course there is no obligation. Interested executives should send for their copy today.

ROBERTS CONTROLLED GAS HEATING UNIT

ROBERTS-GORDON APPLIANCE CORPORATION

DELAWARE AVENUE AT TUPPER STREET

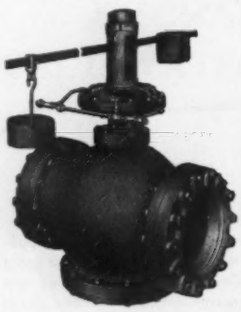
CURTISS BUILDING BUFFALO, N. Y.

TRADE MARK

A Differential Regulator

FOR MIXING GASES

CF



In the conservation of our natural gas by mixing with coke-oven gas this regulator is destined to have a place of importance.

Get The Details

The Chaplin-Fulton Mfg. Co.

Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in all Sizes From 1 Inch to 24 Inches; For All Service. 1 oz. up to 2,000 lbs. Pressure to Square Inch.

28-40 Penn Avenue **Pittsburgh, Pa.**

REPRESENTATIVES:

WESTCOTT & GREIS, Inc.
Sales and Service
Dallas — Los Angeles — Tulsa

JNO. W. CRAWFORD
Sales Engineer
1855 Industrial Street Los Angeles

Or Any Jobber

The healthfulness of Gas as fuel should not be overlooked. It is the most potent thought for us to develop in the mind of the Public. It will pay big dividends in better public relations and increased sales.

C. B. BABCOCK CO.

San Francisco Los Angeles

Modern Compressor Plant *at* Kettleman Hills

(Continued from Page 75)

Switch boards for the generators with panels for controlling all outside circuits and switches for opening or closing motor-operated valves.

Two 5½-inch by 2¾-inch by 5-inch vertical air compressors, one driven by a 15-horse power motor and the other by a gasoline engine. These compressors furnish air to three storage tanks each 36-inches in diameter by 10 feet long, designed for a working pressure of 250 pounds per square inch. The air is used mainly for starting the engines and as the motor driven set is operated automatically a supply of high pressure air is practically assured at all times. The gasoline engine driven compressor was installed as an added precaution as it could furnish air in case of a shut down of the entire plant with no air to start the auxiliary units available.

CONVENIENCE FOR REPAIRS

One convenient feature in the layout of this compressor station is in the proximity of the machine shop to the main engine room. These are located 50 feet apart. A travelling crane with a capacity of two tons operates from one building to the other; a raised platform is situated between them, so that repair parts for either building, if not needed immediately, may be deposited there until desired. This eliminates the necessity of carting by trucks and saves infinite time and bother. Roadways pass on both sides of the platform so that heavy parts can be loaded on or unloaded from trucks.

In the machine shop adjacent to the engine room, everything is the last word in modern repairing facilities; all tools are motor driven; windows extend the full length of the building on each side, providing the maximum amount of daylight.

A drip or scrubber with an automatic bleeder was installed on each intake line to remove any liquid which might get into the compressor cylinders and also one on the discharge line leading from the gas cooling tower to the main transmission line to remove any condensation due to compression. Outlets were provided also for the future installation of dust scrubbers if they should be needed, which is possible on one of the lines which carries gas from dry gas wells.

The gas intake and discharge headers in back of the compressors and along the cooling tower are 16 inches in diameter; a 16-inch non-return valve was placed in the line at the outlet of the gas tower to prevent high pressure gas from the main lines getting back into the plant should a break occur in the plant piping.

There were also installed on the lines entering the plant from the field motor-operated valves which can be closed by operating a switch in the auxiliary building in case a man could not reach them in time of trouble.

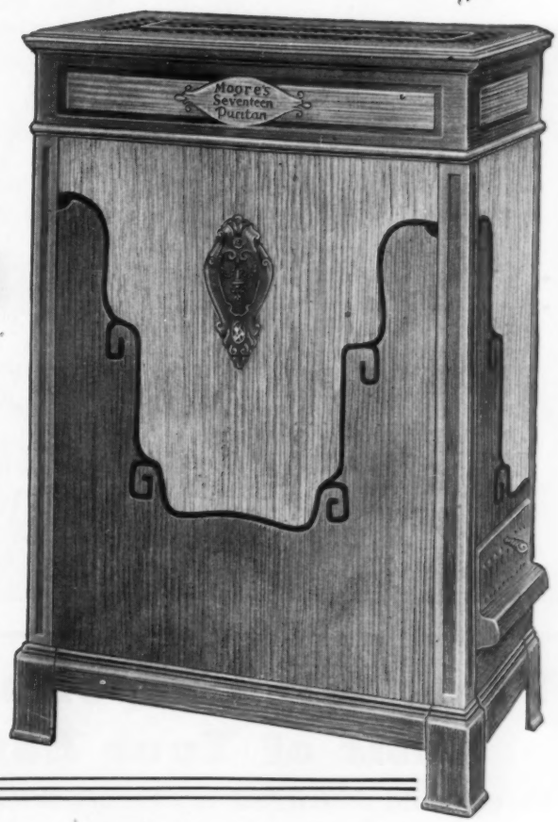
Other buildings have been erected on the same property upon which the compressor station is located, to serve the operating and maintenance crews for the station and pipe lines. These buildings include a warehouse, garage and automobile repair shop, office building, chemical laboratory, dormitories for the single men, cook houses, and dwelling houses.

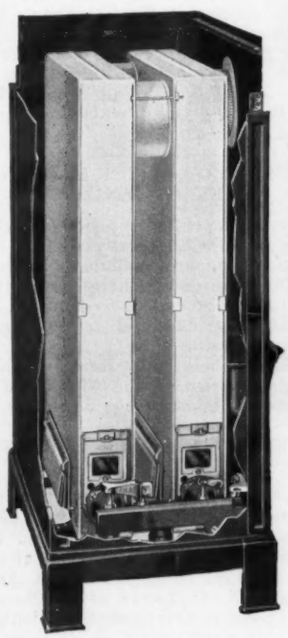
LIVING QUARTERS

The living quarters have been laid out and equipped to afford every possible com-

MOORE'S

Gas Heaters Designed For The Modern Home





Moore's Warm Air Circulating Gas Heaters

Gas as a fuel is judged by the beauty, safety and durability of the appliance in which it is used. Moore's originated the circulating heater and Moore's Gas Heaters are built to deliver the utmost in comfort, convenience and satisfaction. They are designed to harmonize with modern home furnishings.

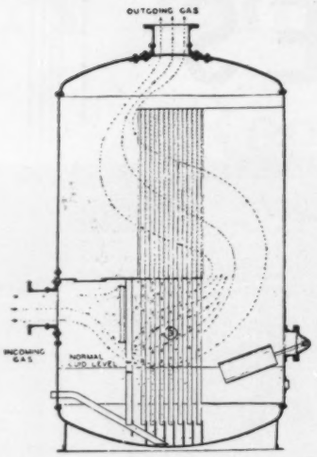
Moore's Gas Heaters are made in four sizes and three finishes —to meet every requirement. Fully approved by the laboratories of the American Gas Association. » » Ask for information.

Moore Brothers Company

Cooking and Heating Appliances

Joliet SINCE 1857 Illinois

What's in a Name?



PRIMITIVE peoples have an admirable custom of choosing names on a basis of personal qualifications . . . Deerfoot, Hawk-eye, Thundervoice. Even the present-day much eschewed "Percy" once proclaimed its owner a valorous warrior with a piercing eye.

Choosing a name should constitute a profoundly solemn occasion, in that the person or thing being named, henceforth proclaims its innermost self to the world.

The name MIST-D-FIER, conferred on the new Campbell scrubber, was chosen with this end in view—to truthfully characterize for all time this individualistic piece of natural-gas equipment. Test after test shows that it takes *all* the oil mist and water mist out of the gas line. What better name could be applied to it?

For full description, write for Bulletin No. 6.

J. A. CAMPBELL CO.
Natural Gas Engineers
CONSULTING DESIGNING CONSTRUCTING
PHONE-416-93
P.O. DRAWER 669
LONG BEACH, CAL.

STEARNS-ROGER MFG. CO., DENVER
MID-CONTINENT AGENCY

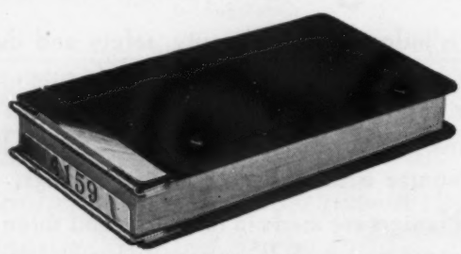
Your Meter Reports Are the Basis of Your Earnings

They Should Be Carried in a Secure Weather Proof Binder

We Have It in

Our Style Bar-S As Shown Below

Write for Samples and Prices



Grand Rapids Loose Leaf Binder Co.

Home Office
Grand Rapids, Michigan

Western Distributors

A. CARLISLE & CO.
UPHAM & RUTLEDGE, Inc.
SAN FRANCISCO, CALIF.

LOOPOST BINDER CO.
LOS ANGELES, CALIF.

fort and convenience to the employees living there. Each dwelling house is surrounded by a screen porch. The roof is elevated above the main body of the house, allowing an air space above it. These features make the living conditions much better during the periods of extreme heat in the summer. The rooms have French doors opening out on the screen porches, so that, if desired, beds or other pieces of furniture can be easily moved outside. The houses are equipped with electric lights, radiant-type heaters with vents, gas ranges, automatic water heaters and refrigerators. The roofs are covered with asbestos shingles, which not only afford fire protection but will make the houses much cooler in summer. Picket fences surround the houses, so that each family has its own private yard. The same general style of architecture was used for the dormitory, cook house, and laboratory, to provide comfortable living and working conditions.

The cook house was designed to accommodate 60 persons if needed, and is modern in every detail. It is equipped with gas ranges and ovens, automatic water heater, electric dish washer, and a built-in cold storage room, with automatic refrigerating machinery. A small building separated from the cook house was constructed to provide living quarters for the cook and his help, a new feautre in oil field camp design.

A tennis court and swimming pool have been provided for the use of the employees at the camp. All roads have been laid out to make all buildings accessible by automobiles; along them trees and shrubs have been planted, so that, in a couple of years, it will be a very attractive camp.

GAS HEATING PROGRESSES IN PACIFIC NORTHWEST

E. L. Payne, vice-president and general manager of the Payne Furnace & Supply Co., Inc., Beverly Hills, Calif., has just completed a trip through the Pacific Northwest, visiting distributors and dealers for Payne gas furnaces. Mr. Payne reports that interest in gas heating is particularly active in this section, one large factor being the aggressive campaign waged by the Seattle Gas Co., through the activities of J. Earl Jones, commercial manager, and Ray Trowbridge, in charge of the Company's industrial heating department.

During his trip Mr. Payne made arrangements for representation of the Payne Furnaces in the Yakima Valley through the Seattle Plumbing Co., which operates a branch in Yakima.

MONETT, MO., OFFICE IS OPENED BY OZARK ORGANIZATION

The formal opening of offices at Monett, Missouri, was held recently by the Ozark Distributing Company, affiliated with the Gas Service Company, a Doherty property. A total of 1,264 visitors registered at the offices on the opening day and several gas appliances were sold.

On the day before the formal opening a special gas edition of the Monett "Times" was published, honoring the occasion.

CONFERENCE ON PIPE CORROSION HEARS K. H. LOGAN

An open meeting for those interested in pipe protection and corrosion was held on Wednesday, April 30, at 2:30 p.m. in the auditorium of the Los Angeles Gas and Electric Corporation Building at Los Angeles, California. K. H. Logan of the Bureau of Standards led an informal discussion of the observations which he has made in uncovering the pipe samples buried at different locations.

LOW LIMIT CONTROLS PREVENT AIR STRATIFICATION

—new Minneapolis-Honeywell Low Limit Controls maintain minimum radiator temperature and control*

The new Low Limit Controls* maintain minimum water temperature in hot water heating systems. They bring to gas-fired systems the sustained radiation that has made hot water heating popular. They maintain minimum duct temperature in warm air systems and minimum radiator temperature in steam heating systems, overcoming air stratification and cold floors.

The new Nite Switch on Types 77 or 7710 Clock Thermostats activates the low limit control for maximum comfort during the day, and cuts it out at night for greatest fuel saving . . . Complete descriptions of these profit-building new controls are now ready. Write today for detailed information. Minneapolis-Honeywell Regulator Company, Executive Offices: 401 E. 28th Street, Minneapolis, Minnesota.

On Hot Water Heating Systems:
Type L22-1 Low Limit Control for Series 20 wiring.
Type B6510, Scale 60° — 200°, for Series 10 wiring.

On Warm Air or Steam Heating Systems:
Type L22-2 Low Limit Control for Series 20 wiring.
Type B6510-F, Scale 60° — 200°, for Steam Heating Systems.

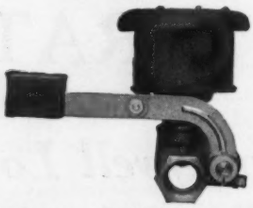
MINNEAPOLIS HONEYWELL HEAT REGULATOR

Gas Burning! RESULTS

Ventite Inspirating Burners — 6 sizes for intermediate and high pressure gas.

Motor Driven Control Valves 6 sizes—125 lbs. W.P.

Industrial Heating Equipment



Magnetic Shut-Off Valves 6 sizes—125 lbs. W.P.

Send for Booklet of Results—Not a Catalog

Pacific Coast Representative

The T. G. ARROWSMITH CO.

661 Howard St.

San Francisco, Calif.

MAXON PREMIX BURNER CO.

INDUSTRIAL FUEL BURNING EQUIPMENT — FOR OIL OR GAS, OR BOTH COMBINED

MUNCIE MAXON PREMIX BURNER INDIANA

RUUD WATER HEATERS

Quality-built since 1889 . . . A hundred different types, sizes and combinations . . . Advertising and merchandising helps . . . Branches in all large cities . . . Travelling representatives everywhere.

RUUD WATER HEATERS

Rehydration Methods *in* New Orleans

(Continued from Page 65)

The rehydration plant, together with the changes necessary at the regulator stations, cost approximately $18,800, and the approximate operating cost for one year was around $7,500. This includes the services of one engineer, who devotes practically 100 per cent of his time to this work, and the use of a mechanic and helper, with the addition of one drip truck used to replenish the oil supply at regulator stations and to keep all drips in the immediate vicinity of points of saturation, clear of oil condensation. We might add that this is in addition to our regular organization for pumping of siphons, which has remained intact since the conversion to natural gas.

The following figures apply to the period during which natural gas has been distributed in the city, from August, 1928, up to and including February, 1930:

Gas received: 16,562,573,514 C. F.

Domestic: 4,722,242,670 C. F.

Industrial and other classifications: 11,840,330,844 C. F.

The procedure regarding rehydration so far has proven successful, but that is no indication that we have completely solved the problem of gas leakage. Of course, there are objections to saturated natural gas, as there are to manufactured gas—such as ill effects of corrosion, meter deterioration, trapped services, etc., but our experience for one and a half years use of rehydration has made us enthusiastic advocates of the practice.

E. P. MILLIKAN HEADS PAC. COAST DIVISION, AMERICAN STOVE CO.

Edward P. Millikan has been appointed manager of the Pacific Sales Division of the American Stove Company, with headquarters in San Francisco, California. The new organization will be put in operation July 1, and will direct the sales activities of all divisions of the American Stove Company in California, Oregon, Washington, British Columbia, Arizona, Nevada, and a part of Idaho. A branch office will be maintained at Los Angeles, and will be in charge of E. B. Hamner.

B. S. Pedersen, who for 27 years past has been with the Clark Jewel Company on the Pacific Coast, will continue to be affiliated with the new organization in northern California and in addition to the Clark Jewel, will also represent the products manufactured by all divisions of the American Stove Company.

Mr. Millikan was with the Clark Jewel division in California from 1921 to 1923. Since that time he has been with the Clark Jewel Company in its Chicago office.

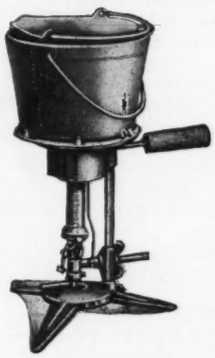
P. G. AND E. WANTS PERMIT TO SELL GAS AT PETALUMA

Pacific Gas and Electric Company, with headquarters in San Francisco, California, has applied for a permit to exercise franchise rights for the service of natural gas in the city of Petaluma, Sonoma County.

J. C. McCLUSKEY GOES TO S. F. OFFICE OF N. G. E.

James C. McCluskey has been transferred to the San Francisco office of Natural Gas Equipment, Inc., where he will assist John C. Newman, resident manager.

JOHNSON FURNACES and GAS BURNERS

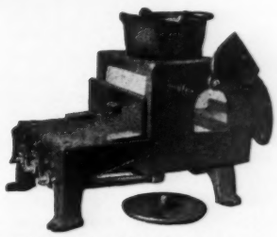


For Soldering and Soft Metal Melting!

The Johnson No. 8 Torch and Melting Pot is a unit which enjoys wide popularity among men who work with metals. The many uses to which this efficient, inexpensive tool may be put are explained in our free catalog. Write for it!

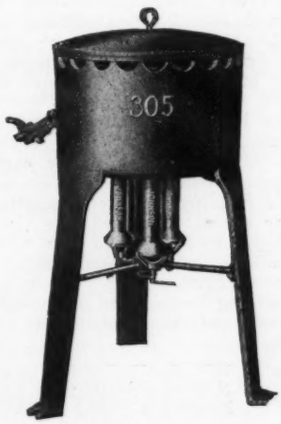
Johnson Automatic Hand Torch

City gas pressure is all that is needed for this handy torch. Equipped with pilot light and push button valve. Set at an angle, it is easy to handle. Write for catalog giving full details.



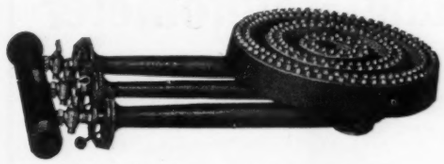
If You Use Soldering Coppers You Need This Bench Furnace!

It is the famous Johnson No. 118 Combination Bench Furnace that is being used so successfully in hundreds of shops throughout the land. Heats soldering coppers and melts soft metals. No blower —only city gas pressure required. Write for catalog giving full details and showing other models of bench furnaces.



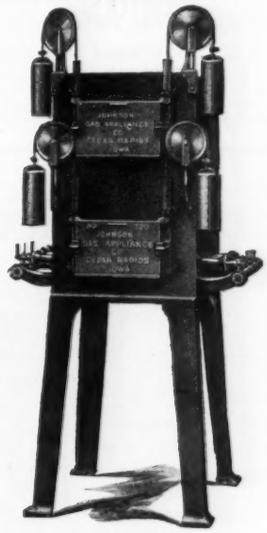
A High Quality Melting Furnace!

The Johnson No. 300 Soft Metal Melting Furnace is designed to give quick, economical service. It is also built from the ground up—stout and durable. For melting lead, babbitt, tin, type metal, white metal, solder, scrap, and all other low or medium fusion metals and alloys. Write for full details.



Ring Burners

Air and gas are delivered to these famous Johnson 60BCE Atmospheric Gas Burners through the improved Venturi Air Mixers and Tubes, and heavy A. G. A. Type Valves equipped with Johnson Patented Direct Jet Regulator. A high flame temperature results from this scientific combination of exclusive features. These burners are made up of three independent burners which may be used singly, in pairs, or in triple. We also design and build special burners for any need. Write for details.



Johnson Heat-Treating Furnace

This is the Johnson No. 700 Heat-Treating Furnace which is used extensively in shops throughout the country. This furnace is especially popular in vocational schools. Heats up quickly. Can be regulated to a very fine degree. Unequalled for carbonizing hardening, annealing, etc. No blower required—city gas pressure only as needed. Write for full details.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Pacific Coast Representative: C. B. Babcock Co., 135 Bluxome Street, San Francisco

—makers of quality gas appliances—

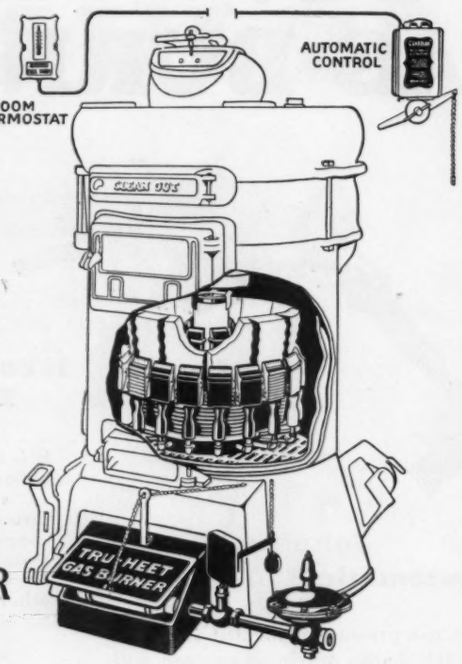
NOW The New Improved

Gas Conversion Burner with Safety Pilot

The **TRU-HEET Automatic Conversion Burner Unit** is equipped with an Automatic Safety Pilot, Automatic Room Temperature Regulator, Automatic Air-intake, Snap-Valve and Gas Regulator.

Quickly and easily installed in all types of hot water, vapor and steam heating boilers and warm air furnaces. Placed right on the grate bars without dismantling the furnace.

There is a big market for an efficient gas conversion burner.



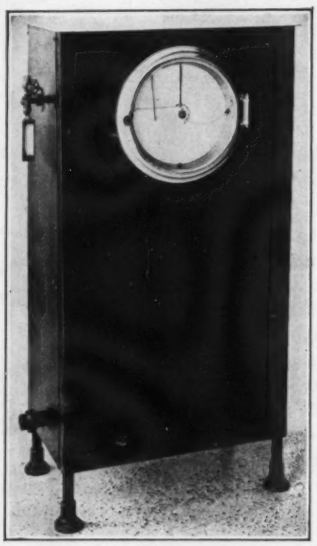
Write for attractive net prices

TROOP WATER HEATER COMPANY

2516-26 Jane Street
Pittsburgh, Pa.

Improved Recording Gravitometer

A sample of gas is continually balanced against air in order to determine its true specific gravity.



The instrument is fully compensated for temperature and barometric changes and gives an accurate record of gravity.

THE REFINERY SUPPLY COMPANY

Branch:
3404 Main St.
Dallas, Texas

621 E. 4th St.
Tulsa, Okla.

Pacific Coast Rep.:
The Braun Corp.
363 New High St.
Los Angeles, Calif.

DALE TO MANAGE AT HOUSTON FOR COOPER-BESSEMER

COOPER-BESSEMER Corporation announces the establishment of an office in Houston, Texas, at 505 Niels Esperson Building, in charge of R. H. Dale.

Mr. Dale is a native of Dallas, Texas. He attended the University of Texas, receiving his bachelors degree in electrical engineering in 1916 and his E. E. in 1917. After graduation, he joined the army, serving as instructor at the school of Aeronautics and as superintendent of the Engine Division in the army school of Automotive Mechanics.

R. H. Dale

From 1919 to early this year Mr. Dale was a sales engineer with the Tennant Company at Houston, specializing in the application of compressors and centrifugal pumps for producing and refining departments of oil companies; also in heat exchange equipment for refineries.

The newly opened Houston office completes the Cooper-Bessemer Corporation's southwestern representation, other Texas offices being located in Dallas, Amarillo and Borger.

HOUSTON GAS AND FUEL CO. DEPTS. IN NEW BUILDING

The distribution department, meter room, shop and service departments of Houston Gas and Fuel Company, Houston, Texas, have moved into a new building recently completed. This is the first move made by the shop department of the company in 16 years, the old building having been erected in 1914.

The new home was planned to meet every requirement of the modern gas service department, allowing for adequate expansion with future growth of the city.

The old building has been converted into warehouse space for United Gas Company, of which Houston Gas and Fuel Company is a subsidiary, and is located directly opposite the new edifice.

The building is composed of one-story for office space and basement to be used as storage room.

AMERICAN GAS PRODUCTS CORP. HOLDS FOURTH CONFERENCE

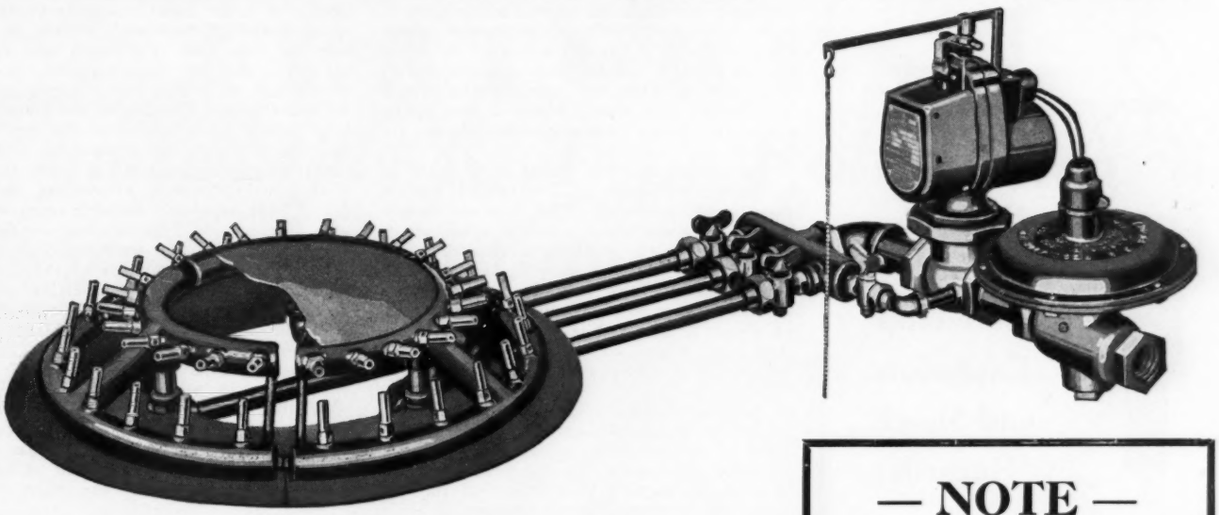
The Fourth Annual Sales Conference of the American Gas Products Corporation convened at the Hotel Knickerbocker, New York City, on March 26, 1930. The first day was spent in general session; the second at the laboratory of the American Radiator Company in New Rochelle, N. Y.; and the third day was spent at the factory of the American Gas Products Corporation at Belleville, N. J. General conferences were held in the offices of the company in the Chrysler Building, New York City.

The Fourth Annual Dinner was held at the Hotel Knickerbocker on the evening of March 28.

NAYLOR PIPE CO. MOVES NEW YORK OFFICE TO CHRYSLER BLDG.

Naylor Pipe Company, Chicago, Ill., announces the removal of its New York office from 25 Church Street to new quarters at 3116 Chrysler Building, Lexington Avenue and 42nd Street.

BARBER *Automatic* JET GAS BURNERS



— NOTE —

A COMPLETE AUTOMATIC CONVERSION GAS BURNER LINE—FOR 90% OF YOUR INQUIRIES AT PRICES ATTRACTIVE TO EVERY HOME OWNER.

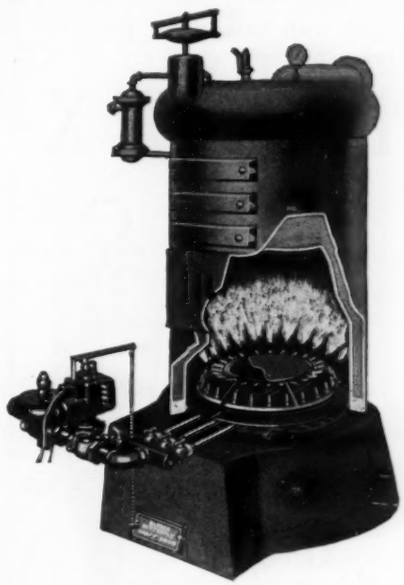
REAL ECONOMY

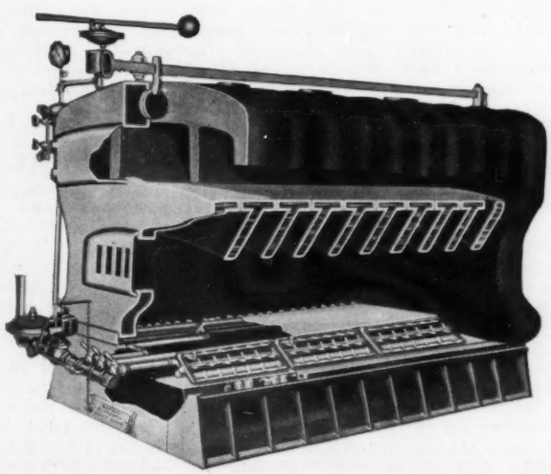
for your prospect and for you

For your prospect, real economy because the Barber *Automatic* Jet Gas Burner brings him the freedom of clean, healthy, uniform gas heat at the lowest cost. No longer must he spend his time climbing up and down cellar stairs to open and close drafts, to shovel coal or carry out ashes. No longer must he pay high cleaning bills because of the dust and dirt. No longer must he be paying doctor's bills because of varying unhealthy temperatures in his home. This medium priced, scientifically correct burner will convert any good coal-burning boiler or furnace into an efficient gas heater.

For you, real economy because the quickest and easiest way of building the house heating load is a conversion, particularly with a Barber Burner. Its low cost and efficiency appeal to the prospect who does not wish to junk his coal-burning furnace or boiler for a new gas-heating plant. Such a prospect is in the majority.

You can install a Barber Burner any time of the year. In winter or in summer, it can be installed quickly through the clinker door opening on top of the grate bars. Start today using the Barber Burner to build your house heating load.

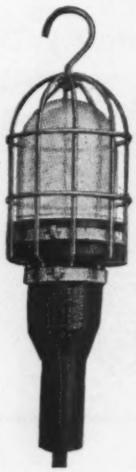




Barber *Automatic* Jet Gas Burners are supplied for practically every size and make of round and rectangular boilers and furnaces designed for burning coal. Standard burners in four sizes for furnaces and boilers with grate diameters from 16 to 31 inches, inclusive. Special assemblies for rectangular fireboxes. Write for prices, discounts and full descriptions of Barber Burners.

The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3702-04 Superior Avenue. Cleveland, Ohio

VAPROTEX



A New VAPOR PROOF LAMP That Eliminates Explosion and Shock Hazards

NO. VGH

Gas Companies

are standardizing on "Protex" and "Vaprotex" for portable light equipment.

Both "Protex" and "Vaprotex" are listed as Standard by the Underwriters' Laboratories.

Sold with or without hook or reflector.

PROTEX

The New RUBBER HANDLED LAMP Saves Money and Time Gives Safety Shock Proof

NO. PGHR

Ask Your Dealer

Distributed in the West by

E. A. Key Co., Inc.

2814 Santa Fe Avenue
Los Angeles, Calif.

Gas *in the* Manufacture *of* Glass

(*Continued from Page 64*)

provided for slight horizontal adjustment to care for the different thickness of glass. Each of them is counter-weighted to cause enough pressure on the sheet to prevent slipping and to keep the movement upward. The rollers are placed about 1 foot apart, except at points where baffle plates are located.

The entire drawing frame is enclosed in a box-like structure of steel plates and is lined with asbestos. The first or lowest pair of rollers is about 3 feet, 6 inches above the surface of the glass in the furnace. The enclosed part of the drawing machine extends upward from a point a few inches below the first pair of rollers for a distance of about 22 feet. The top end is covered with steel plates which act as dampers by which the temperatures inside the machine may be regulated. Small low pressure gas burners are located at intervals between the rollers to assist in heat regulation. Four pairs of rollers extend above the top of the enclosed section of the machine and rise through an opening in the floor of the cutting room overhead for a distance of about 4 feet, making a total length of the machine about 30 feet.

One of the outstanding features of the drawing machine method is the elimination of the ordinary lehr for annealing. The glass sheet does not undergo alternate cooling and reheating operations as is the case where other methods are used, but instead emerges from the machine in proper condition for immediate cutting and shipping.

In starting the machine it is necessary to float the drawing block and then apply pressure downward to a working position in the drawing pit, which is in exact alignment with the bottom pair of rollers. A bait is then lowered and attached to the molten glass within the slot. The bait consists of a framework of thin steel bars the same width as the rolls, with a fringe of common nails dangling from its lower edge. As pressure is applied to the drawing block, the nails come in contact with the glass and the movement of the bait starts upward and the continuous sheet is started.

A portable water cooling device in the shape of a wide flattened tube is placed just above the drawing block on each side of and close to the slowly rising sheet. This sets the glass to a point that allows it to enter the rolls without marking.

The melting and working tanks are of the regenerative type, using from four to six generators on each side of the melting tank, depending upon the size of the tank. Two gas burners, consisting of 1-inch pipes upset at one end and drilled 7-16 inch, are placed near the bottom of the generator firing chamber and enter the chamber approximately 1 foot from the outside wall of the tank proper. The burners are placed on an angle, horizontally and slightly tipped downward. The gas streams meet at an apex at a point just inside the melting tank and are so adjusted in position relative to gas and internal tank pressure to allow the flame to terminate about three quarters of the way on the opposite side of the tank. About a 1-inch opening is kept around the burner where it enters the firing chamber to allow secondary air to pass for the purpose of protecting the burner tip.

The working end of the furnace is at right angles to the melting end, resembling the letter "T" in shape. This part of the tank is approximately 6 feet in width and 75 to 100 feet in length, depending on the number of drawing machines and the capacity of the melting tank. The most efficient size tanks usually require from six to eight drawing machines. Above the glass line the long tank is divided into separate chambers, one for each machine, by means of bridges built into the masonry and sub or underbridges floating in the glass. These form walls extending from the top of the furnace to below the glass line, effectually isolating the upper part of each compartment from the others, preventing the transfer of heat between adjoining compartments, and making possible very close regulation of the temperature for each machine without regard to the requirements of the other machines and completely independent of them. It thus is made possible to draw glass of different thicknesses and requiring different roller speeds and temperatures, in adjoining chambers. This is accomplished without interfering in any way with the flow of glass in the lower part of the tank, where it has a clean sweep under all the compartments. To aid in keeping the glass in good condition there is a flow spout at each end of the working tank for use when required.

Maintaining Temperatures

To assist in maintaining the temperature in the compartments at the desired degree, each of the individual chambers from which the glass is drawn is fitted with four gas burners, two at the front end and two at the back. Every 20 minutes, synchronous with the main tank, the flow of gas is reversed. A separate gas supply is provided for each of the two groups of drawing chambers. The gas is distributed to the two groups through two identical systems of overhead piping.

Furnace temperatures throughout the entire plant are measured by recording pyrometers. Along the crown of the main tank there are spaced four platinum thermocouples 18 inches long. They are protected in both primary and secondary protecting tubes.

Similar thermocouples are installed at the canal and cooling chamber, and one is placed in each of the individual heating chambers of the working tank. Temperatures at these points are indicated and recorded by instruments like those used on the main tank. The temperature at the back of the melting tank is maintained at 2540 to 2560 degrees. Just back of each drawing machine the temperature runs from 1800 to 1900 degrees.

At the sides of the sheets drawn by the Fourcault machines there are always strips of thick glass, necessitating the cutting-off of the border or selvage along each side. Thus sheets of a gross width of 48 inches and 54 inches will trim down to net widths of 44 inches and 50 inches respectively.

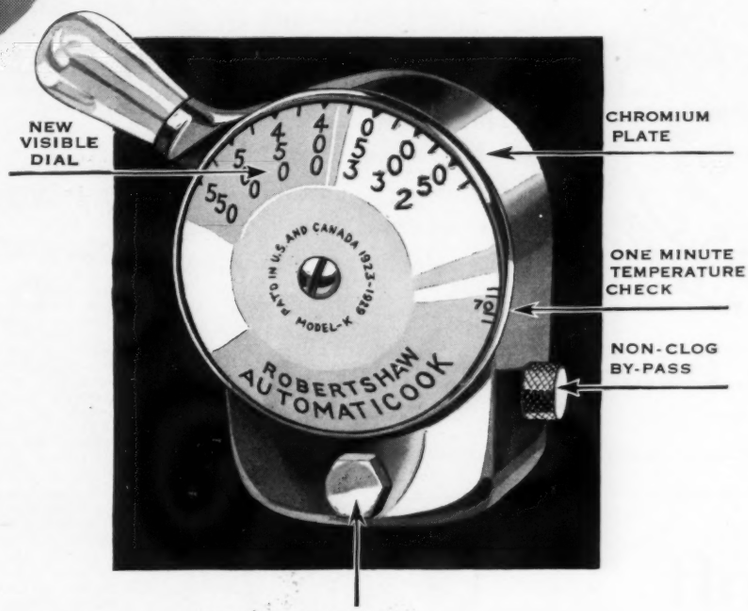
Sheet Thickness

The thickness of the sheet is determined by the speed of the lifting rollers. The faster the rollers revolve, the thinner will be the glass. A sheet of single strength glass is drawn at the rate of 30 inches a minute; double strength, about 18 inches; and triple strength, about 10 or 12 inches a minute. It is said that glass over half an inch thick has been made successfully on Fourcault machines in Europe.

With the size of tank discussed in this article and with the eight Fourcault machines operating at capacity, the daily output would be approximately 1,000 boxes and a monthly total of 30,000 to 40,000 boxes, depending upon the thickness of the sheets.

5 FEATURES!

make the "K" Type Robertshaw's greatest AutomatiCook



WHEN the new gas ranges reach you, look for the brand new, greatly improved Robertshaw "K" type AutomatiCook. Examine it. You'll find in the new AutomatiCook selling arguments that will make your ranges move faster.

Five new features—smaller, neater, more compact. There's a fully visible dial. There's a handsome chromium finish. There's a fool-proof One-Minute Temperature Check. A non-clog by-pass. And only *one* bolt holds the whole AutomatiCook to the range! Temperature setting, calibrating and all working parts accessible from outside the range.

We've prepared some descriptive literature of this new AutomatiCook. Write for it now. Study it before your ranges begin to arrive . . . . If you'll send us the names of your employees handling, selling or installing ranges, we'll be glad to send them literature to help sell ranges faster, too . . . Write—*today!*

ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY

Youngwood, Penna.

PLAY SAFE!

By Specifying and Using

"COLONIAL" BRAND

Re-Chrome Meter Leather

BESSE, OSBORN & ODELL INC. · COLONIAL · BRAND · BOSTON, U.S.A. · RE-CHROME METER LEATHER

in your New Meters and Repair Work. This Leather will stand the Five-Minute Boiling Test.

This Trade Mark stamped on each New Zealand Lambskin is our guarantee to you that each skin has received the greatest care in its selection and tanning.

Besse, Osborn & Odell, Inc.

51 South Street, Boston **177 William St., N. Y.**

Just off The Press

Our New

Refractories Catalogue

and Handbook

Containing a wealth of comprehensive information and technical data, carefully compiled and revised.

We will be glad to send you a copy of this useful book on request.

Gladding, McBean & Co.

San Francisco **Los Angeles**
Portland **Seattle**
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PATENTED

Martin Unit Gas Furnaces

ARE THE RESULT OF 38 YEARS HEATING EXPERIENCE

MADE IN FOUR SIZES

Electric, Thermostat or Manual Control
Approved by A. G. A. Laboratory and by the City of Los Angeles

Write for your copy of "Modern Heating Methods"

PHILLIPS HEATING, VENTILATING & MFG. CO.

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Los Angeles, California

Live Agents Wanted

TESTING LABORATORY · A.G.A. · APPROVED

CARLOAD FURNACE SHIPMENT REFLECTS HEATING ACTIVITY

Carload shipments of furnaces to many points is one index of growing interest in gas heating, according to E. L. Payne, vice-president and general manager of the Payne Furnace & Supply Co., Beverly Hills, Calif. Early in April a carload of Payne gas furnaces was shipped to the Payne distributor at Atchison for dealers throughout the State of Kansas. Another carload shipment went forward in April to Buffalo, N. Y., to Payne dealers serving Eastern Ohio and the western section of the Empire State.

A.G.A. PRODUCTION AND CHEMICAL CONFERENCE, MAY 21-23

The Fourth Annual Joint Production and Chemical Conference of the American Gas Association's Technical Section will be held on May 21-23 at Cleveland Hotel, Cleveland, Ohio, under the auspices of the Carbonization, Water-Gas and Chemical Committees of the Section.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.,

Required by the Act of Congress of August 24, 1912, of *Western Gas*, published monthly at Los Angeles, Los Angeles County, California, for April 1, 1930.

State of California,
County of Los Angeles—ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Jay Jenkins, who, having been duly sworn according to law, deposes and says that he is the publisher of *Western Gas*, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Jay Jenkins, Los Angeles, Calif.
Editor—Geo. H. Finley, Los Angeles, Calif.
Managing Editor—Geo. H. Finley, Los Angeles, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Western Business Papers, Inc., 124 W. Fourth St., Los Angeles, Calif.
Jay E. Jenkins, Los Angeles, Calif.
James E. Jenkins, Los Angeles, Calif.
Geo. H. Finley, Los Angeles, Calif.
Elliott Taylor, San Francisco, Calif.
Craig Espy, Dallas, Texas.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

JAY JENKINS, Publisher.

Sworn to and subscribed before me this 28th day of March, 1930.

(SEAL) JOSEPHINE C. WHITING,
Notary Public.

(My commission expires March 25, 1932.)

Welsbach
HOTZONE
SELF-ACTION
GAS
WATER
HEATER

Member American Gas Association
Member Pacific Gas Association

50 Hawthorne Street
SAN FRANCISCO, CALIF.

Beauty **The foundation of all beauty treatments depends on cleanliness, and cleanliness calls for Hot Water. Welsbach advertising and Welsbach window displays have been built up on the beauty appeal. Hotzone Water Heater itself has been improved until it is truly a beautiful piece of household equipment. Altogether, the program has resulted in a banner year for Hotzone sales. We thank our many customers for their support and promise important announcements shortly which will materially increase sales during 1930.**

Welsbach Company, Gloucester City, New Jersey

EMPIRE
Oil Meters

Positive Displacement Oscillating Piston Type

Simple in Construction—Easy to Operate—Low in Cost of Maintenance

EMPIRE meters are highly accurate, and **stay** accurate. They are invaluable for cracking and absorption processes; for gas companies; for refiners and distributors of gasoline and all distillates of petroleum; for measurement of crude oil, cold or hot.

ALL SIZES ½" TO 6"

Standard meters will withstand working pressures of 150 lbs. to the square inch. High pressure types will handle 325 lbs. Higher pressures and special types to order.

National Meter Company

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1048 Folsom Street, San Francisco **2309 E. 8th Street, Los Angeles**

THE BABY DIGGER

The Ideal Modern Way To Dig Gas Trench!

Cleveland Baby Diggers are unequalled for downright usability and trenching satisfaction. Compact — transportable — economical. Tough — fast — dependable. Precision built of finest materials. A wheel type trencher on full crawlers. You'll find Cleveland Trencher pioneering the features that count. Write for particulars.

THE CLEVELAND TRENCHER COMPANY

"Pioneers of the Small Trencher"
20100 St. Clair Ave.
Cleveland, Ohio, U. S. A.
Edward R. Bacon Co., 17th at Folsom Sts. San Francisco, Cal., Distributor

SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.
Chester, Pa.

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Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $5.00 monthly on 12-time contract.

HELP WANTED—MALE

WANTED — SALES REPRESENTATIVES and distributors by Eastern manufacturer. A new gas range accessory that offers a good proposition. Address Box E-66, *Western Gas,* 124 West Fourth Street, Los Angeles, California.

SITUATIONS WANTED—MALE

Industrial gas engineer having seven years experience designing industrial furnace equipment for high and low B.t.u. gases desires position with manufacturer or utility on engineering or sales. Address Box E-26, *Western Gas,* 124 West Fourth Street, Los Angeles, California.

Married man 30 years of age, general office man, desires connection with gas company in Oklahoma or Texas. Reference if desired. Address Box B-77, *Western Gas,* 124 West Fourth Street, Los Angeles, California.

House heating and industrial engineer with 20 years experience in the natural gas industry desires position with gas company or equipment firm. Applicant has thorough knowledge of all types of gas heating equipment, and is capable of organization work, as well as compiling manuals. Address Box No. B-97, *Western Gas,* 124 West Fourth Street, Los Angeles, California.

CLEVELAND GAS BURNER CO. HAS NEW CONVERSION LINE

Cleveland Gas Burner & Appliance Co. has brought out an automatic line of gas conversion burners for round coal-burning heating furnaces and boilers.

These automatic burners will be made in four sizes to specifically suit round grate areas ranging from 14 inches to 24 inches in diameter, inclusive. The line is being designed and built with a view of meeting a demand for gas conversion burner equipment for the smaller or moderately priced homes.

These burners are equipped with plain thermostats, magnetic gas valves and pressure regulators, and also with improved pilot control supply to the burner units, together with proper baffles. The magnetic valves so operate that in the event the electric current is turned off for any reason, the burner immediately goes out, and when the current is resumed, the burner automatically goes on again.

Further information concerning the new line may be had by writing to The Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

STRONG

ANTI-CORROSIVE

FIRE PROOF

EFFICIENT

Partial View of Our Newly Equipped Vitex Factory

VITEX

This Semi-Vitrified Gas Vent and Flue Pipe is Manufactured in San Francisco for Use Throughout the United States by

PLANT RUBBER & ASBESTOS WORKS

537 BRANNON STREET SAN FRANCISCO

Most Processes

Requiring Steam need OFELDTS...

"Steam in 4 minutes"

Ofeldt

TRADE MARK

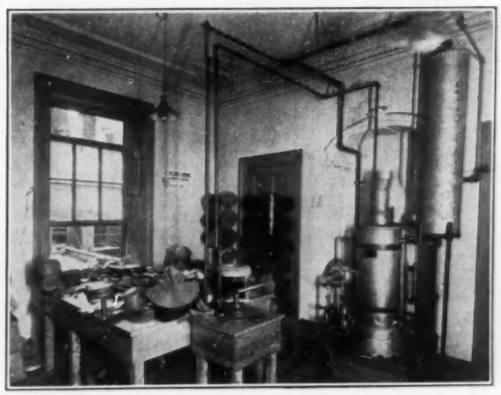
Water Tube Boiler

Since all steam processes demand abundance of clean steam at constant pressure, the OFELDT gas-fired boiler is a perfect process steam source.

—Automatic, gas-fired, quick steaming, compact, and *safe*—the OFELDT also eliminates fuel troubles, labor of firing and ash problems, as well as long inefficient pipe lines. And a range of sizes up to 25 Hp. makes it easy to supply the exact OFELDT needed.

Perhaps this explains the diversity of Industries using Ofeldt boilers. Is there a prospect in your territory? *Write for full details.*

USED IN
Dairies
Bakeries
Laundries
Textile Plants
Food Industries
Bottling Plants
Cleaners & Dyers
Candy Manufacturers
Hotels, Restaurants
Wood Finishing, Cabinet Working
etc.



Style A Ofeldt Boiler supplies steam in hat manufacturing plant, for heating hat blocking forms.

New York—9 Park Place
Boston—100 Arlington St.
Chicago—363 W. Erie St.

MEARS-KANE-OFELDT INC

1903-1915 EAST HAGERT ST. PHILADELPHIA

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St. Louis—2010 Locust Blvd.
Birmingham—Am. Trust Bldg.

Makers of Automatic Gas Boilers for Over a Quarter of a Century

and makes a Saving

The above installation of Webster Radiant Gas Burner in a large western hospital was made by the local gas company under the supervision of Webster Engineers.

It completely solved their boiler problems and made a friend and customer for the gas company, through the flexibility and capability of gas for producing high ratings on the boilers with a large saving.

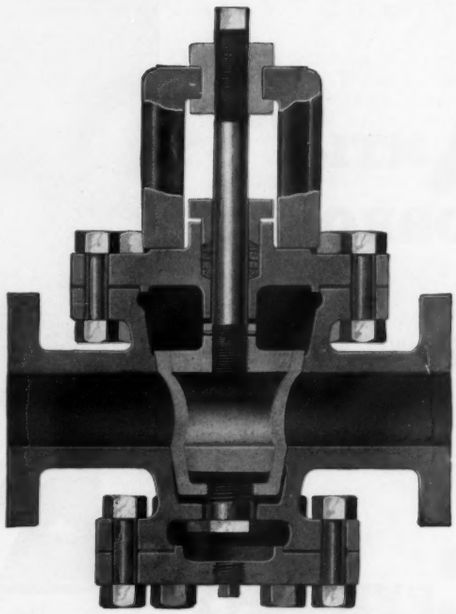
In the conversion of commercial and industrial heating units, each installation presents factors in design that must be handled with care in order to insure satisfactory operation and economy.

To attain this end, Webster offers in conjunction with its equipment, a complete engineering service. This service is available to the gas companies at any time for cooperation in making proposals and installations.

Webster Engineers will be glad to work with you.

The Webster Engineering Co.
TULSA - OKLA.
Boiler Burner Division of
The Surface Combustion Co.
Subsidiary of Henry L. Doherty & Co
2375 DORR STREET TOLEDO OHIO
Branch Offices in All Principal Cities
Member of Industrial Furnace Manufacturers Association

FOSTER



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"Guaranteed for Ten Years"

1. Adjustable.
2. Non-Lubricated.
4. Removable Seat and Plug.
5. 100% Opening Through Valve.
6. Stainless Steel Plug.
7. No Friction Loss.
8. No Eddy Currents.
9. Cannot "Stick" or "Freeze."
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11. Re-Packed Under Pressure.
12. Clean-Out Plug on Bottom.
13. Seats Removed Without Taking Valve From Line.
14. Sizes 2" to 6" Iron or Steel For All Pressures.

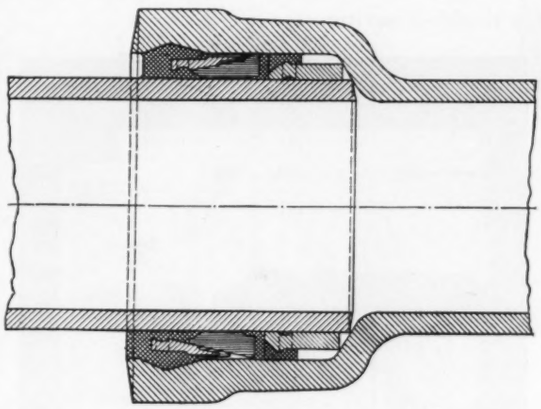
Exclusive Distributors

DUCOMMUN CORPORATION

Los Angeles San Francisco

"Pacific Pipe's FLEXPAN Joints Held Gas

when other pipe was pulling apart—"



—So reports a western gas executive, of recent sub-zero weather. Contraction caused joint-leaks in other kinds of pipe, but mains laid with McWANE-PACIFIC CAST IRON PIPE with FLEXPAN JOINTS **held the gas.**

Line deflections, the heave and pull of frost—whatever happens, the FLEXPANS **hold the gas.**

At last—with FLEXPAN JOINTS—you can use CAST IRON PIPE, the **only** victor over corrosion. An end to coating and coddling your mains, too.

McWANE-PACIFIC Cast Iron Pipe has a resilience you never knew existed—made of close-grained, tough, easily cut iron that "serves by the century" at low cost per foot and *lowest* cost per year.

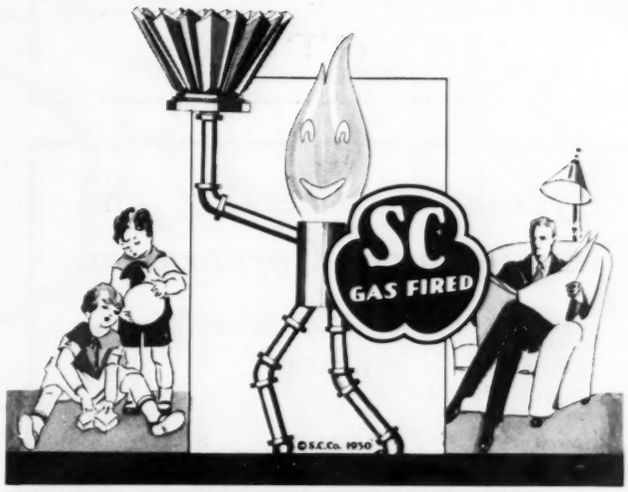
Before buying another foot of ANY kind of pipe, investigate McWANE-PACIFIC FLEXPAN—the pipe that made high gas pressures possible with cast iron (permanent) pipe. (Warranted to hold 100 lbs. pressures.) Sizes now available, 1¼, 2, 3, 4, 6, and 8 inches.

Pacific States Cast Iron Pipe Co.

San Francisco, Los Angeles, Portland, Denver, Salt Lake

McWane Cast Iron Pipe Co.

BIRMINGHAM, PHILADELPHIA, CHICAGO, DALLAS



THIS IS JANITROL

The Invisible Janitor

He is now being enthusiastically used by over 20,000 families, giving complete satisfaction to more than 130 of the leading gas companies . . . a tried and true gas burner with unlimited profit possibilities.

(1) **JANITROL is the greatest domestic load building appliance.**

(2) **JANITROL is the lowest priced completely automatic, quality burner.**

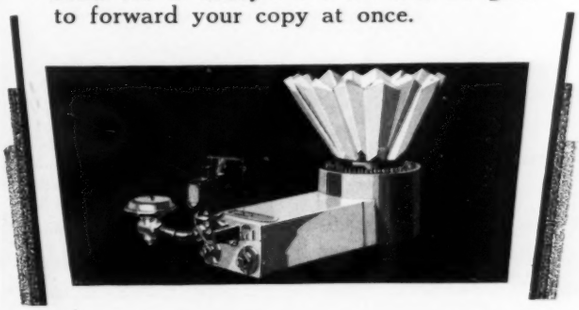
(3) **JANITROL paves the way for future sales of complete gas fired equipment . . . it "sells" gas as a fuel.**

(4) **JANITROL comes to you completely assembled . . . it is the easiest to install.**

(5) **JANITROL is listed as standard by the underwriters' Laboratories.**

(6) **JANITROL is backed by an efficient sales and service organization constantly at your command.**

Have you a copy of the new Spring JANITROL Merchandising Plan? . . . . Send for it today . . . we will be glad to forward your copy at once.



The Surface Combustion Co.
INCORPORATED
Subsidiary of Henry L. Doherty & Co.
2375 DORR STREET, TOLEDO, OHIO
Branch Offices in All Principal Cities
Mantle Recuperator Division — Webster Engineering Co.
Member of Industrial Furnace Manufacturers Association

DIRECTORY

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CHICAGO

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NATURAL GAS ENGINEERS
COMPRESSOR PLANT DESIGN AND CONSTRUCTION
P. O. BOX 669 LONG BEACH, CALIFORNIA

REID AND BARTLETT
CONSULTING NATURAL GAS ENGINEERS
ATHLETIC CLUB BUILDING, DALLAS

SMITH-EMERY CO.
Chemists—Engineers
Established 1910
Analyses and tests. Represent Pittsburgh Testing Laboratory for inspection at Eastern foundries, mills and shops.
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If you would keep in touch with the Gas Industry developments in the West, send a check for $2.00 to

WESTERN GAS
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Company.....

Position Occupied.....

Street Address.....

City and State.....

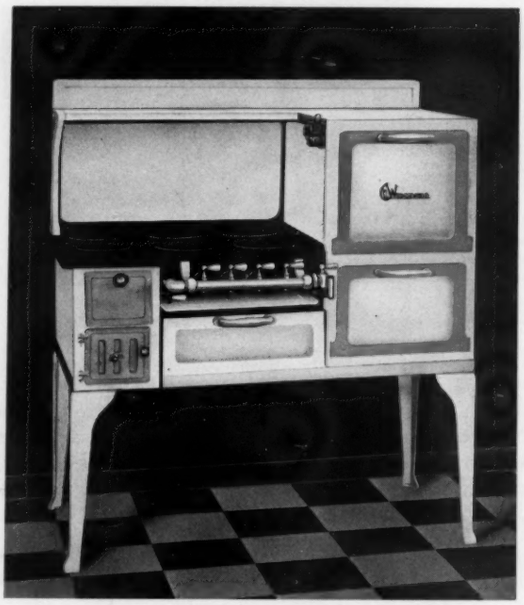
Subscription Rates: 1 Year $2.00; 3 years $5.00;
Foreign $3.00 per year

Wedgewood

Plus Natural Gas

Safe—Clean—Economical—Efficient

A combination that brings you the luxury of modern, automatic care-free cooking and baking at a decided saving.



The New 1930 Models

offering new style touches, new beauty of green and ivory porcelain, and a new Wedgewood stain-proof, rust-proof enameled cooking top, leave nothing to be desired and speak for themselves on any sales floor.

With or Without Kitchen Heater
De Luxe or Standard Models

The Wedgewood line meets every demand for a perfect gas stove at a moderate cost. A Wedgewood for every purse.

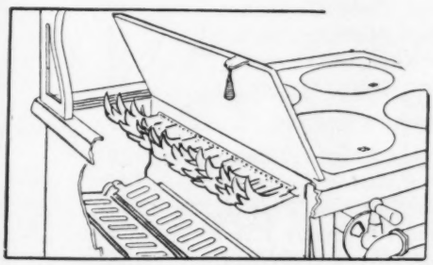
Over a Million Satisfied Users!

THOUSANDS OF WOMEN ARE thanking us for the WEDGEWOOD COOKING RECIPES which come to them over their radios every TUESDAY AT 11:10 A. M.

Tell your friends and customers to listen in on these N B C morning programs.

James Graham Manufacturing Company
Largest Stove Manufacturers in the West
The all-inclusive Gas Line
Since 1882
San Francisco Newark, Calif. Los Angeles

MORE PROFITS



The Patented Burner

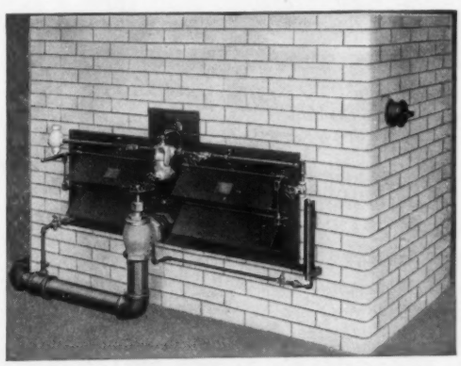
For those who feature the *Spark Extension Top Gas Stove —increased and easier sales—* the "Patented" built in burner —an exclusive Spark feature adds *one-half more gas top cooking surface* than any other gas stove of similar size.

SPARK GAS STOVES

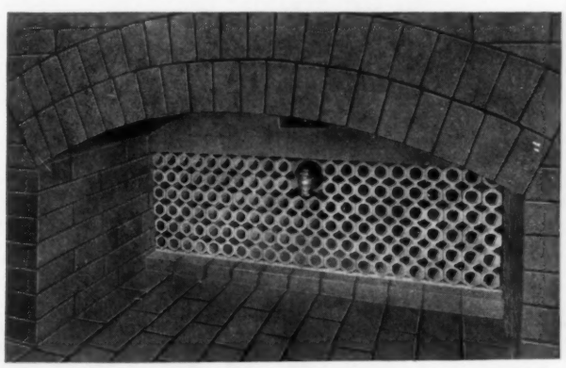
MANUFACTURED BY
Hammer-Bray Co.
Oakland California

SAN FRANCISCO, 180 NEW MONTGOMERY
PORTLAND 330 Union Avenue No.
SEATTLE
LOS ANGELES 7000 Avalon Boulevard

A change to the Leahy Multi-jet Unit *Insures* Efficiency, Capacity, and Satisfaction



Front View—Showing Installation of Combination Gas and Oil Unit.



Rear View—Same Installation—Note All Parts of Gas Burner Exposed to Radiant Heat or Oil Burner Flame are Protected by Refractories, Insuring Long Life.

Its Many Exclusive Features Have Created an Exceptional Demand. Request Bulletin 19-E, Which Explains the Many Reasons for Its Great Success. Designed for Front, Rear, and Vertical Firing.

For Modern, Inexpensive, Efficient Method of Burning Gas and Oil Under Oil Field Boilers Request Bulletin 18-A and 20-A.

LEAHY MFG. COMPANY

1804-1810 East 8th Street **Established 1902** **Los Angeles, Calif.**

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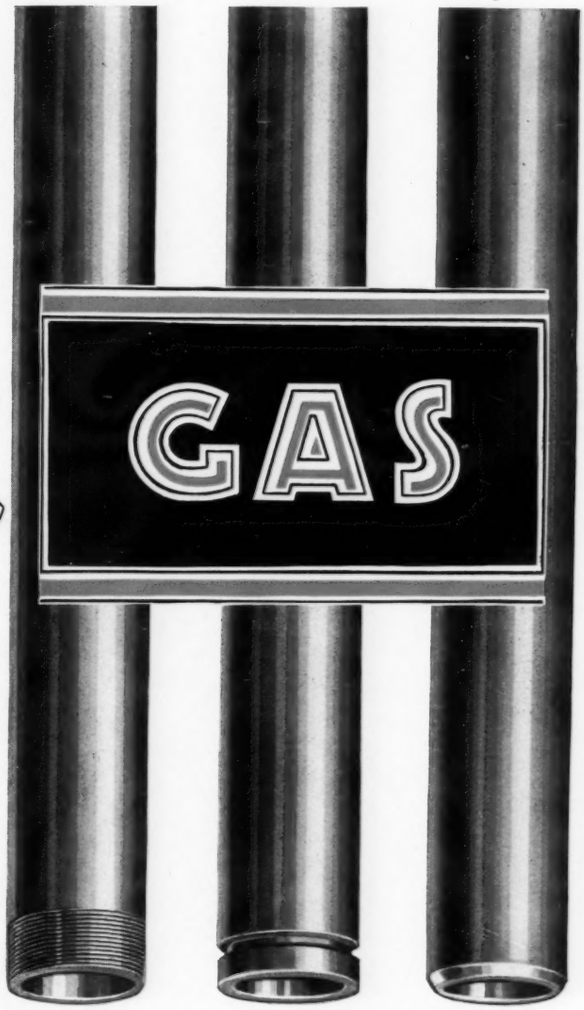
Specify

WALWORTH C.N.I. CAST PIPE *for*



● Walworth C. N. I. (Chrome-Nickel-Iron) cast pipe is the solution for many of industry's problems of pipe corrosion. ● In gas service it offers unusual advantages because it combines the endurance of cast iron with the convenience of other kinds of pipe. ● For you can cut and thread C. N. I. pipe on the job with hand tools and connect it up with regular pipe fittings and valves.

● Send for the C. N. I. Pipe Manual. ● It tells where we recommend the use of C. N. I. pipe — and, with equal frankness, where we do not recommend it.

THREADED for SCREWED COUPLING	GROOVED for VICTAULIC COUPLING	BEVELED for FIELD WELDING

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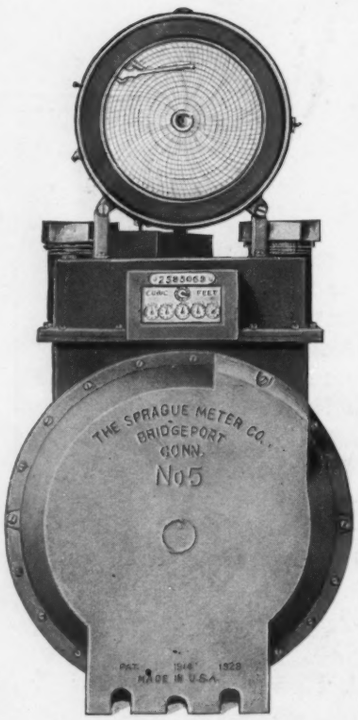

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